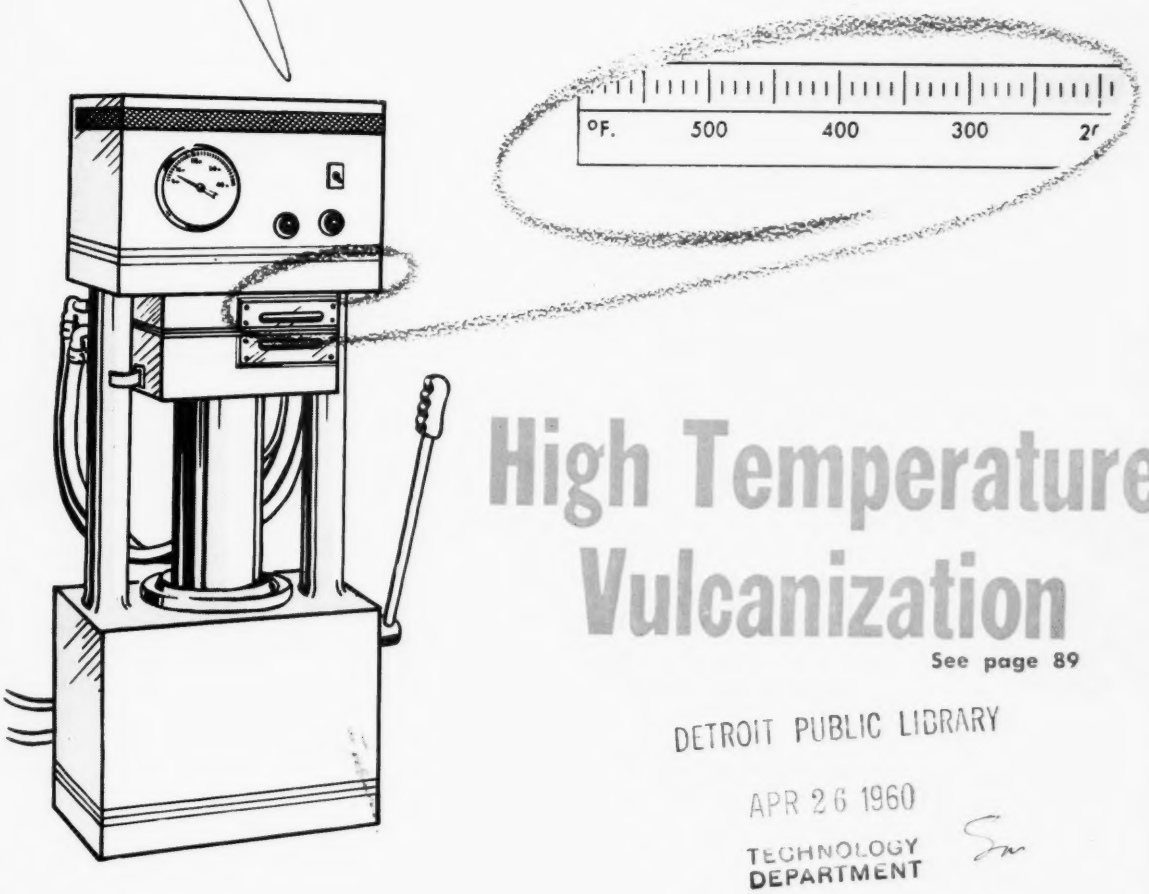
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High Temperature Vulcanization

See page 89

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Brominated Butyl in Butyl Rubber Compounds

By Bluestein and Grossman

See page 98

APRIL, 1960

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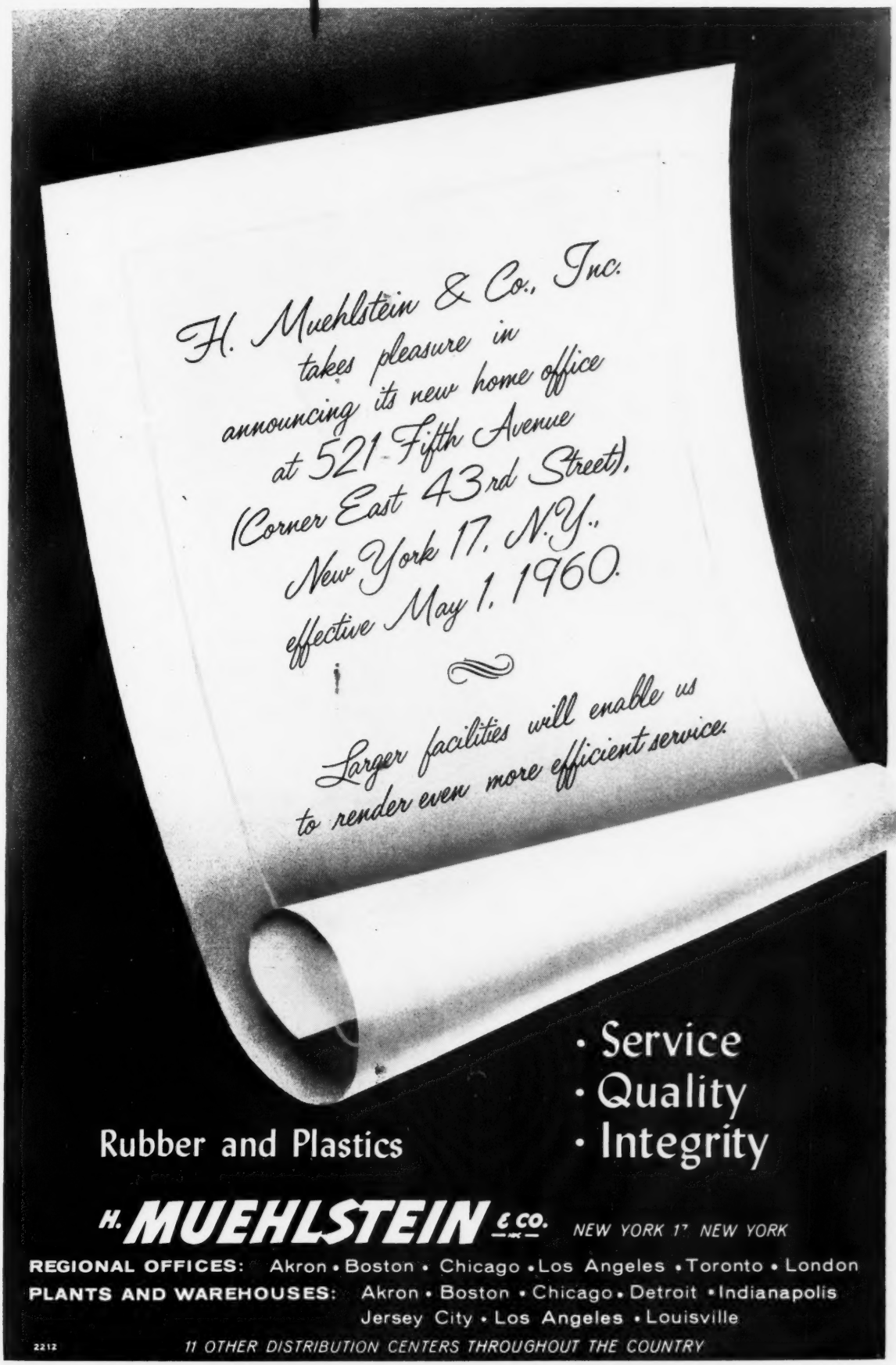
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ARTICLE HIGHLIGHTS

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Spending for new plants and equipment by the rubber industry in 1960 indicates its confidence in the growth of industry markets. Spending at the present level is to continue for five years in some cases. **87**

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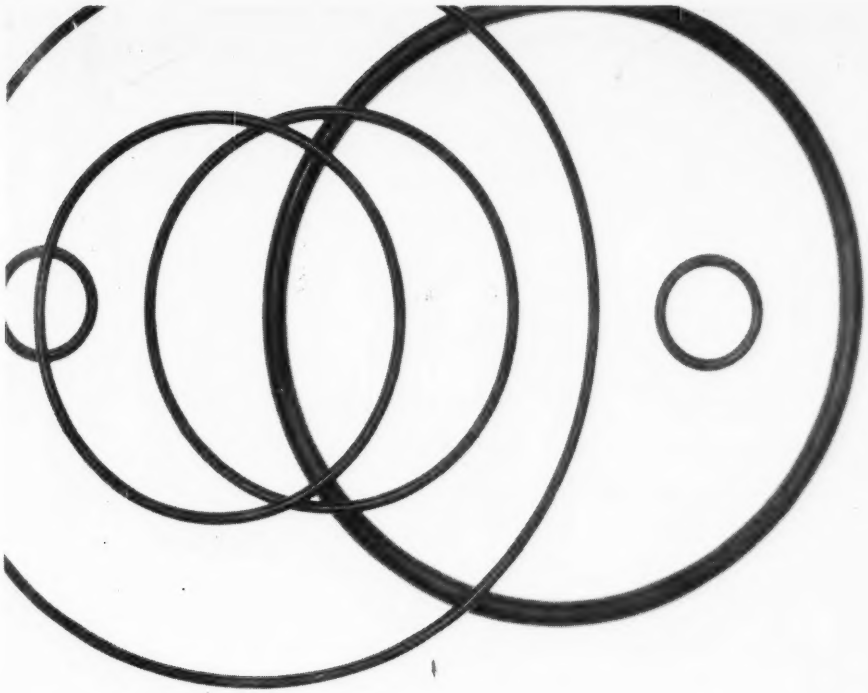
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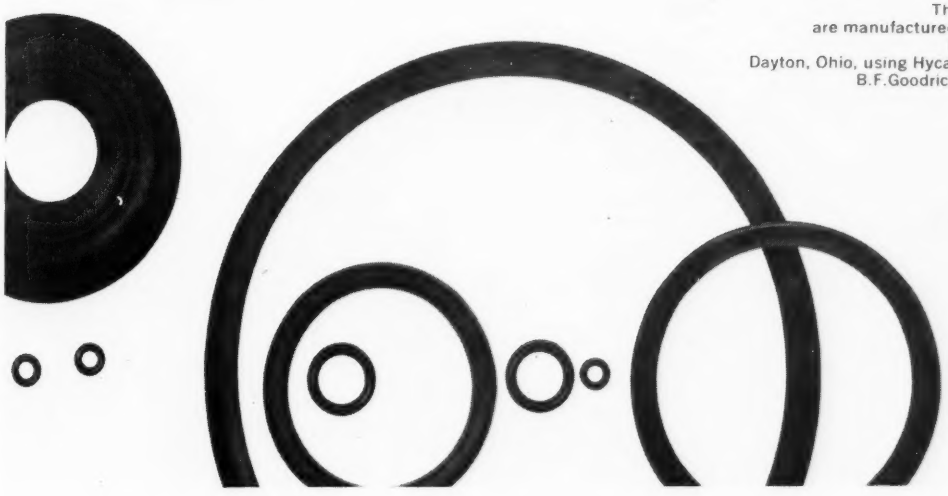
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Cover design by George W. Booth

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Reports are becoming available on the 1958 Census of Manufactures. First two reported this month, of interest to the rubber industry, are concerned with rubber footwear and the reclaimed rubber industry. Rubber footwear shipments increased 34% over the 1954 census figures; while the reclaimed rubber shipments decreased 38%. While the years 1954 and 1958 may not be the best years for yardstick purposes, the figures are interesting and useful in many ways. Reports on other segments of the rubber industry will follow next month.

Some of the confusion about the effect of the Food Additives Amendment on the rubber product manufacturer is beginning to clear. While the bill is still a major problem for manufacturers supplying parts used in food handling, a series of questions posed by the Rubber Manufacturers Association special committee which were answered by the Food & Drug Administration does shed some light on the responsibilities and actions required of the part manufacturer. Major point: responsibility rests on maker of vulcanized product. FDA will give advisory opinion on data furnished by producer, but will not "grant approval."

Oil furnace blacks with modulus values comparable to the channel blacks have been announced by Godfrey L. Cabot, Inc. First three members of new "family" of blacks called "Regal" 300, 600, and SRF were announced in March by Cabot. This would appear to indicate a new era for the compounder in his selection of carbon black type as well as reducing producer dependence on natural gas supplies for certain black types.

Other news regarding carbon black comes from a very active ASTM D-24 committee. Several specifications were recommended for upgrading to standards, and the results of considerable work were reported during the February meeting in Chicago.

Continuing technical progress in rubber and its processing was predicted at Connecticut RG look into the Sixties.

NEWS from ABROAD

Malayan NR Research Reorganization Plans

Full control of natural rubber research will be in the hands of the Malayan Government under the new plan for reorganizing research and its administration, the Controller of Rubber Research, Sir Geoffrey Clay, announced March 1.

Natural rubber cannot possibly meet world demand in the next five years, and the period should be utilized by the Malayan industry for research to improve the position of natural when competition with synthetic rubber becomes keener, Sir Geoffrey said by way of introduction. He went on to express his confidence in the future of natural rubber, adding that manufacturers seemed ready to pay a premium for it. He then outlined his plan which—in full recognition of the changed conditions in Malaya and the justice of the proposition that since Malayan money paid for research, Malaya should be in charge—considers the problems from the viewpoints of local industry and government.

Accordingly, the plan envisages the creation of a Malayan Rubber Fund Board, which would control research policy, financing, and programming; the Board itself would be responsible to the Federation Ministry of Commerce & Industry. The three organizations in London, financed by the Malayan Rubber Fund—the British Rubber Producers Research Association, the Natural Rubber Development Board, and Rubber Technical Developments, Ltd.—as well as the London Advisory Board, would come under the direction of the Malayan Rubber Fund Board (MRFB). The Rubber Research Institute of Malaya would no longer have its own management board, but would be directly under the MRFB.

A Natural Rubber Research & Development Association, with membership appointed by the MRFB (hence subject to the approval of the Malayan Government) would be set up to administer the London organizations named above and also the RRI. To advise the MRFB on scientific matters, a Coordinating Advisory Committee would be formed consisting of five British scientists, two scientists from outside Britain (Dr. W. E. Cake, of United States Rubber Co., has been recommended as one); two nominees of the Rubber Producers' Council; two manufacturers' representatives; and two government representatives.

Thus it is hoped to create the conditions necessary for fully integrated, efficient, and purposeful research.

The research program for 1960 would require $12,400,000 (Straits), to be allocated as follows: 60% to the RRI; 20% to the Natural Rubber Producers' Research Association (as the BRPRA would henceforth be called); and 20% to the Natural Rubber Development Board.

It is mentioned that the government expects to launch an economic survey of countries, except Russia and China, to be conducted by Philip Adams, of the Rubber Growers' Association; necessary economic information on Russia and satellite countries, and China, would be gathered by the intelligence unit of the Ministry of Commerce & Industry, but for the present, at least, no mission is to be sent to these countries.

Sir Geoffrey is to go to Britain in April to get his plans started, and he will have to go again in July to appoint a successor to C. E. T. Mann, director of the RRI, who retired in February after serving the industry for 33 years.

The proposed reorganization of research is viewed with favor in Malaya, to judge by comments published so far, and certain prominent rubber men seem to be especially pleased that control should be shifted to Malaya.

New Rubber Trade Association Formed

After two years of negotiation, agreement has finally been reached on the formation of a single association to embrace all sections of the rubber trade in Singapore and the Federation. Sponsored by the Singapore Chamber of Commerce Rubber Association (SCCRA), the Rubber Trade Association, and the Federation of Rubber Trade Associations in the Federation, the new organization—to be known as the Rubber Association of Singapore and Malaya—will admit all sections of the trade and all races to full membership, and officials will be chosen from both European and Chinese sections. The new Association, furthermore, will represent the interests of all in dealings with overseas markets and the governments of Singapore and the Federation. The executive functions hitherto carried out by the SCCRA will now be exercised by the new organization, which also undertakes to control the ethics of the rubber market and to be responsible for running the clearing house.

Silicic Acid In Thiuram Latex

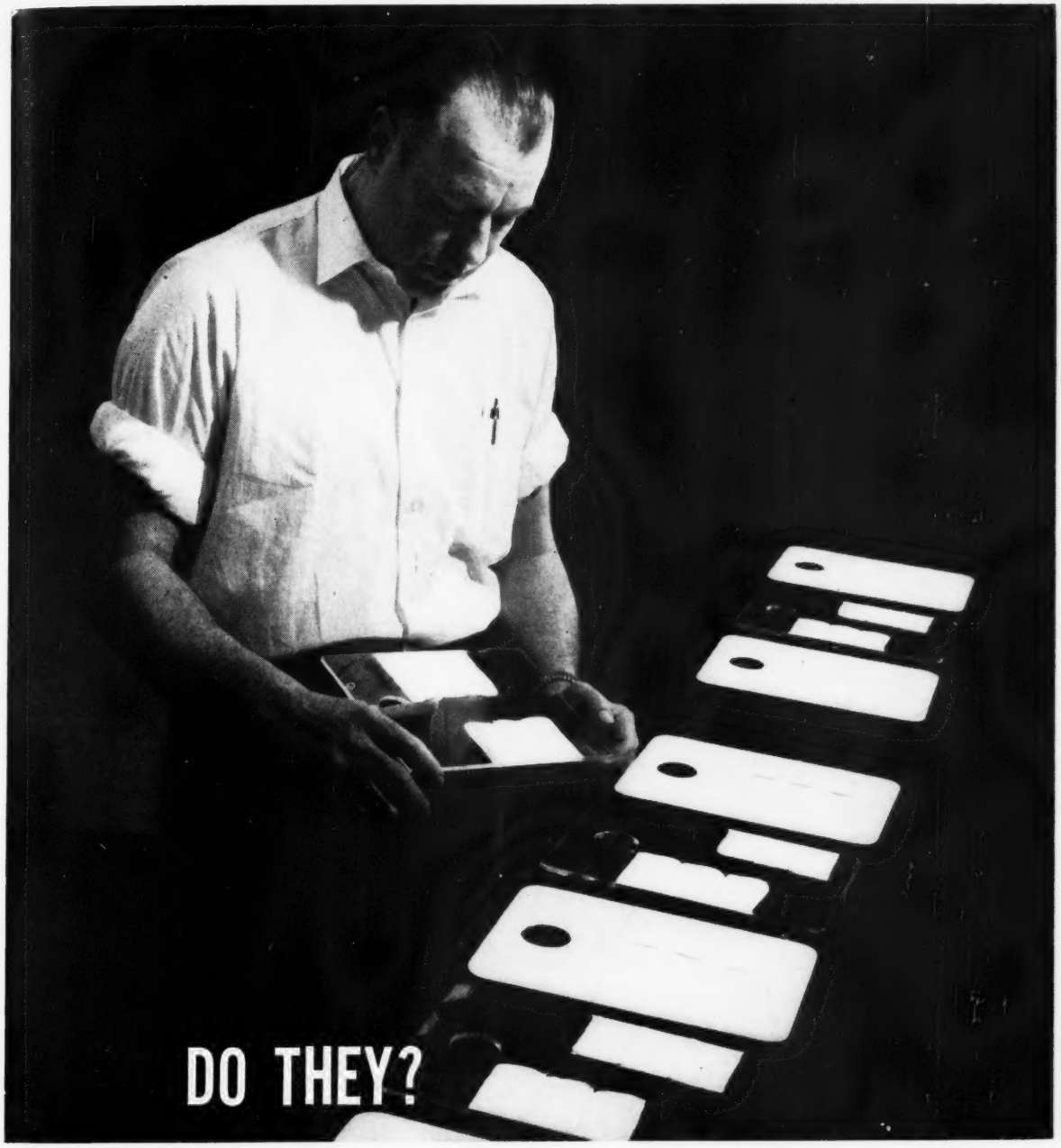
Following up previous work on the effect of highly active silicic acid on sulfur-vulcanized latex,[1] A. Andresen studied its effect on heat aging of sulfur-free latex thread mixes in which crosslinking was promoted by thiuram compounds,[2] as well as its action in the presence of MBIZ.

A suitable thiuram formula was worked out, and conditions were established to permit curing at 90° C in the shortest time possible. Aging tests were conducted on the basic formula (1) containing 1.5 PMTT, 0.75 TMTD, 3.0 ZnO, 4.5 TiO_2, and for comparison, on formula (2) containing 1.5 colloidal sulfur of 85%, 1.0 zinc ethylphenyl dithiocarbamate, 2.75% ZnO, 0.40 $ZnO.H_2O$, 0.5 antioxidant DNP, and TiO_2, 4.5, all calculated on dry rubber content. Results confirmed earlier conclusions that in aging, the type of vulcanizing system is of more importance than the presence of antiagers.

When the effect of SiO_2 was studied on formula (1), the dose of TiO_2 was cut in the same proportion as the former was increased, in order to eliminate the filler effect of SiO_2. It appeared that even 2.0 of SiO_2 enhances the already good aging qualities of thiuram mixes, and that substantial replacement of TiO_2 by SiO_2 still further improves results.

An improved formula, containing 1.5 PMTT, 0.5 TMTD, 4.0 ZnO, 1.0 MBTZ, 3.5 TiO_2 and 1.0 SiO_2, gave tensile values of over 500 kg/cm^2 for unaged samples that had been cured three hours at 90° C; the "bead" or "pearl" effect (local constrictions arising on slow relaxation of thread samples after they were stretched for a short time nearly to the breaking point) was eliminated by raising the molar ratio of PMTT/TMTD to 2:1. Another series of tests aimed at determining the effect of small amounts of SiO_2 in thiuram mixes containing 0.5 to 1.0 MBIZ. To get as clear a picture as possible, the tests were conducted on four mixes made with latex taken from different lots. The basic formula contained the same PMTT/TMTD ratio, but 5.0 ZnO, and TiO_2 plus SiO_2=4.0. One mix was made without MBIZ or SiO_2, one contained only MBIZ; another only

[1] See RUBBER WORLD, July, 1959, p. 514.
[2] *Kautschuk u. Gummi*, Jan., 1960, WT1.



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SiO_2, and one both SiO_2 and MBIZ. Samples were cured, as before, for three hours at 90° C., and aged at 100° C. up to 14 days. It could be shown that:

(1) 3.0 SiO_2 enhances the excellent aging resistance of thiurum mixes containing 1.0 MBIZ.

(2) 1.0 SiO_2 gives the same anti-aging protection as 0.5 MBIZ.

(3) The best aging characteristics are found for all the mixes containing 1.0 MBIZ.

(4) In the long run, the anti-aging effect of 1.0 MBIZ is greater than that of 3.0 SiO_2, but the latter alone is more effective than MBIZ in the first aging stage.

Rubber Facilities Expanded in India

Within the next few years India's annual consumption of rubber may reach 100,000 tons—more than double that for 1959—is the prediction based on the country's plans for industrial expansion in general and developments in the tire and rubber manufacturing industries in particular.

From the chairman's speech at the annual general meeting of the Association of Rubber Manufacturers in India, held last December, we learn of new manufacturing projects that were started or planned in 1959, including the arrangements made by Firestone with the Bombay firm of Kilachand Devchand & Co., to set up a synthetic rubber plant at Bareilly, with a total capital of 135,000,000 rupees; the carbon black plant to be built by Phillips Chemicals in collaboration with Duncan Bros., Calcutta; production of rubber chemicals by Imperial Chemical Industries (India) Private, Ltd., in a factory to be built at Rishra, near Calcutta; manufacture of rayon cord by National Rayon Corp. and Century Rayon Mills, both of Bombay; two plants to manufacture wheels and rims for motor vehicles, namely, one by Wheels India, Ltd. (a joint project of Dunlop, London, and T. V. Sundaram Iyengar & Sons) and one by Guest Keen Williams.

During the year Dunlop started a new tire factory at Madras, India, and Firestone expanded facilities in Bombay to permit increased output of 60%. The two firms between them accounted for production capacity in 1959 of 1,457,000 tires and 1,323,000 tubes, against 1,048,000 tires and 1,071,000 tubes the year before.

W. H. Bremner Retires

William H. Bremner, a pioneer of the rubber footwear industry in New Zealand and general manager of Marathon Rubber Footwear, Ltd., Christchurch, N. Z., recently retired owing to ill health. He came to New Zealand from Canada in the mid-war years to establish manufacture of rubber boots during a period of national emergency and was Marathon's chief production expert for 17 years.

Owing much to Mr. Bremner's skillful direction, Marathon is today the largest producer of fabric and rubber footwear in the Dominion, with a productive capacity in excess of a million pairs annually. In recent years Bremner became interested in the manufacture of molded footwear and arrangements were made with Ro-Search, Inc., Waynesville, N. C., U.S.A., for the use of its process. Since then several million pairs of foam-treat slippers and casuals have been manufactured under license from the American firm.

On his last American trip, Mr. Bremner investigated the merits of the plastic slush molding process and on his return set up a plant for the manufacture of Skellerup slip-ons.

Mr. Bremner is being retained as an advisory director of the company. He has returned to his home town of Woodstock, Ont., Canada.

H. L. Baldwin has been appointed production manager of the company. He accompanied Bremner to Canada and returned to New Zealand via an extensive tour of the United States and Japan.

Pelletized News

More than half Malaya's total rubber acreage is now under high-yielding material, with the mature area approaching 40%. According to data published by the Rubber Research Institute, the average yield per acre is now 854 pounds; only a fifth of the total high-yielding area—about 130,000 acres—gives more than 1,000 pounds per acre; while the area yielding an average of more than 1,200 pounds covers less than 15,000 acres. In considering these unexpectedly modest figures, it should be remembered that averages are depressed by the low yields obtainable in the first year or two of tapping, and also that not all estates separate data for high-grade rubber in reporting yields, it is pointed out.

AUSTRALIA'S output of rubber goods during the fiscal year 1957-58 was valued at £73,979,000, almost £4,000,000 more than for the preceding 12 months and more than £60,000,000 more than in 1945-46. New South Wales and Victoria are the chief rubber manufacturing states, accounting for almost two-thirds of the 565 factories in Australia and employing more than 82% of the total 18,105 persons in the industry.

A new grade of Superior Processing Rubber developed at the Rubber Research Institute of Malaya, and known as PA 80, is said to be the first type of S. P. rubber that can be compounded with other natural rubbers or even synthetic rubbers. Supplied in the form of a light coarse crumb, PA 80 is understood to be so highly concentrated that a mixture of one pound with three pounds of ordinary rubber provides the same processing characteristics as four pounds of the other types of SP rubber. While SP smoked sheet sells at 3½ cents (Straits) above the price of RSS #1, the concentrated PA 80 costs about 13 cents a pound more. At present it is being made at the RRI experiment station at Sungei Bulah, and eight tons have already been sent, by way of trial, to New York, Le Havre (France), Melbourne, and London. The RRI expects to continue manufacturing the product until sales have risen to about 20 tons a month, when local producers will no doubt take over.

THE MALAYAN GOVERNMENT is clearing about 2,500 acres of jungle land in the Bahau sub-district, which will be allotted to smallholders for rubber planting under a new scheme which is intended to enable those eligible, to replant their old rubber without loss of income. Smallholders who own five acres or less of rubber will be granted an equal acreage of government-cleared land which they are to plant with high-grade rubber. They undertake to replant their old trees when the new ones are tappable. In this way, they will double their original acreage of rubber land when replanting is completed.

Despite the fact that profits for 1958, after estimated local taxation, came to 719,020 rupiahs, recent legislation has forced the Kali (Java) Rubber Plantations, Ltd., to decide on selling its entire interest in Java. Drastic monetary measures introduced by the Indonesian Government on August 24, 1959, resulted in the blocking of the major part of the company's assets in Java, amounting to 2,463,700 rupiahs, and it has thus not only been deprived of its liquid resources so that it has to overdraw to finance day-to-day estate operations, but directors now have no hope of obtaining profit remittances for 1957 and 1958.

DUNLOP RUBBER CO., according to Malayan press reports, intends to build a $25,000,000 (Straits) tire plant in Petaling Jaya, if pioneer status is approved by the government, entitling the firm to tariff protection. Dunlop would produce 400,000 tires a year initially, half of which would go to satisfy Malayan needs; while the remainder would be exported. At present about 150,000 automobile tires and 50,000 tires for trucks and other vehicles are required here annually.



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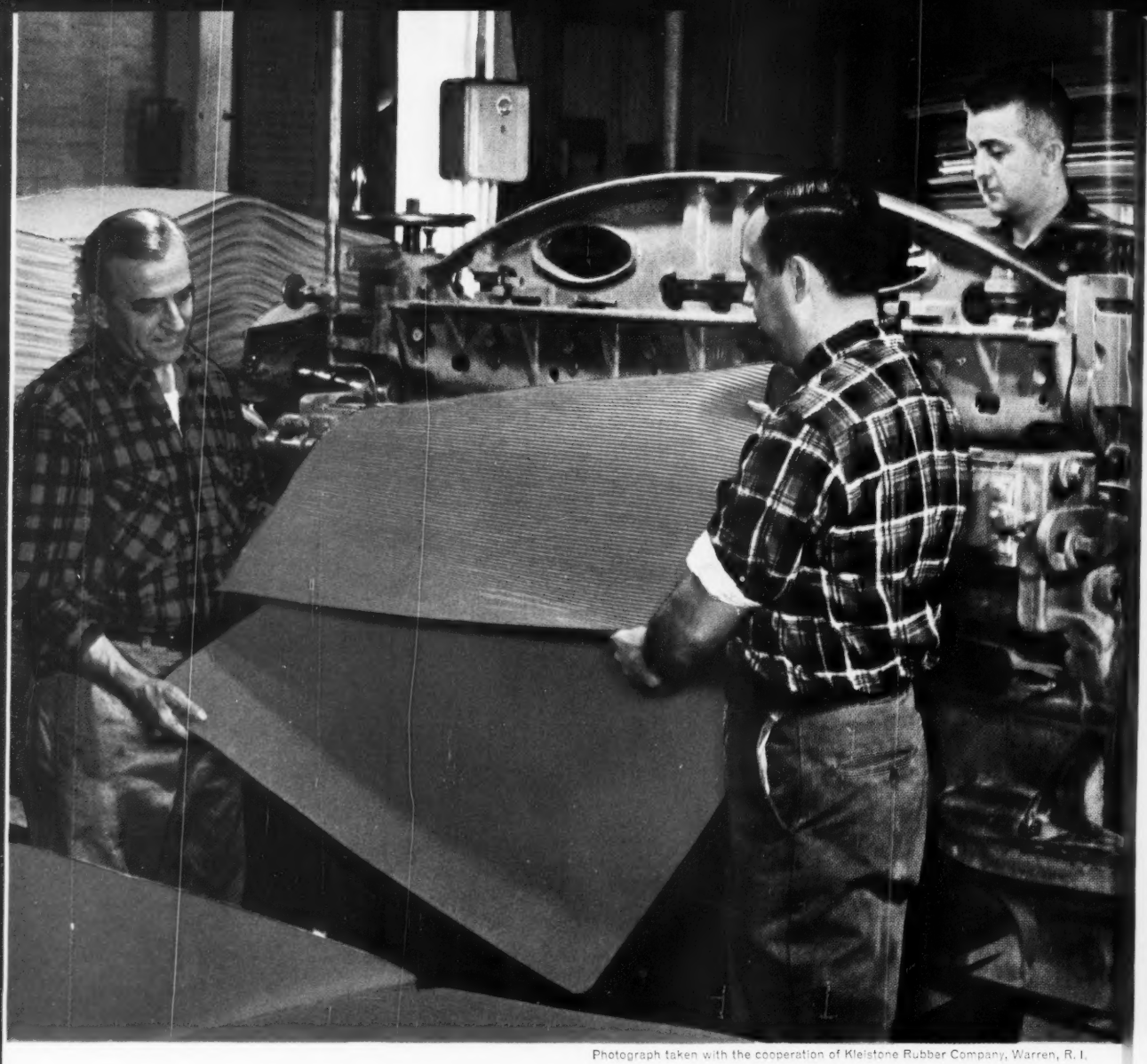


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CHEMICAL DIVISION

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News from Abroad

BUNAWERKE HULS, G.M.B.H., began construction of a plant for making carbon-black masterbatches in Huls, Western Germany, last December, and it is hoped to be able to put the product on the market in the late fall of this year.

Operations were recently resumed at the Harrisons & Crosfield rubber estates in Aek Tarum, Northern Sumatra. The spread of lawless conditions, following in the wake of the rebellion in Central Sumatra in the early part of 1958, had obliged the company to close the estates in July, 1958.

POLYURETHANE FOAM is to be made by two Japanese rubber companies. Arrangements are said to have been made by Toyo Rubber Co., and General Tire Co., on the one hand, and Bridgestone Tire Co., and Farbenfabriken A.G., Germany, on the other. Bridgestone expects to produce 100 tons of the foam monthly.

The rubber/rice negotiations between Ceylon and Communist China for 1960, have, after prolonged discussion, finally ended with China accepting the Ceylon offer to buy 160,000 tons of rice and to sell 17,000 tons of rubber. China has the option to take an additional 5,000 tons of rubber. The price will be five cents a pound above the Singapore price.

SALALA RUBBER CORP. is a new enterprise in Liberia formed by the Dutch plantation company, Rubber Cultuur Mij., Amsterdam, and the Hamburg importing firm of Nordmann, Rassmann & Co. Exploitation has already been started on the large area that has been received in concession from the Liberian Government.

Applications from Ceylon and Rhodesia for permission to establish sections of the Institution of the Rubber Industry locally, have been unanimously approved by the Council of the Institution in London, England. The new sections will promote development of polymer science and technology, encourage technical education, and serve to bring together those engaged in the rubber industry in the countries involved. In January, 1959, branches of the Institution were set up in South Africa, in Johannesburg and Durban.

PIGMENT-CHEMIE, G.M.B.H., is the name of the company recently formed in Cologne, West Germany, by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A., and Sachtleben, A.G., für Bergbau u. Chemische Industrie, Cologne, to manufacture and sell titanium dioxide pigments. A new factory with initial annual capacity of up to 18,000 tons is being built in Homberg, Niederrhein.

JOHNS-MANVILLE MEXICANA, S.A., recently opened the first Mexican factory for industrial packings, in Naucalpan, Estado de Mexico, in anticipation of the expected increased needs of Mexico's growing industrial development and particularly to serve the new petrochemical industry now being established with American and British financial aid. This factory is scheduled to be in full running order by 1964.

By 1960, half the acreage of mature estate rubber in Malaya was expected to consist of high-yielding material, as compared with one-third in 1953; corresponding data for smallholder rubber indicate a rise by 1960 to 25%, from 8% in 1953. This gratifying result will largely be owing to the Federation of Malaya's replanting program which stimulated replanting on a total of 1,200,000 acres on estate and smallholdings during the period 1947-1959. The new trees have a potential yield of 1,500 to 2,000 pounds per acre per annum. What actual yield under commercial conditions will be, and consequently to what extent overall average yield will be increased remain to be seen. However, a substantial increase over the present average overall yield of 500 pounds per acre may confidently be expected.

THE INTERNATIONAL RUBBER STUDY GROUP will meet for the first time in Malaya in September, 1960 (the exact date has not yet been fixed). The seven-day conference will be held in Kuala Lumpur and will consider such problems as that of increasing world production of natural rubber, the increasing use of synthetic latices and their relation to the position of natural latex, discussions on new uses and possibilities for natural rubber, and suggestions and ideas for meeting the marketing problems of natural rubber.

Russian experimenters report that when caprolactam is polymerized, a certain amount of low molecular substances (oligomers) remain in the polymer; later, a low-molecular weight lubricating agent is deposited on nylon-6 cord. I. P. Nagdaseva and others[1] examined the effect of these low molecular substances on heat and temperature stability, fatigue resistance and bond strength of rubber to nylon 6 cord. It was found that heat stability of this cord is reduced not by the presence of the caprolactam oligomers, but by their oxidation products. With increased content of oligomers in the fiber, however, fatigue resistance of the cord under repeated stretching at high temperature is reduced, and adhesion properties are impaired. The presence of an anion-active lubricating agent had no effect on heat stability of the cord.

[1] *Soviet Rubber Technology*, Nov., 1959, p. 27.

PRODEX CORP., Fords, N. J., has completed a licensing agreement with Henschel-Werke G.m.b.H., Kassel, West Germany, by which the latter company will manufacture Prodex Corp.'s complete line of plastics extrusion machinery. Henschel-Werke will manufacture modern Prodex extruders with 1¾-inch to 8-inch screw diameter and in a variety of screw designs, fitted to the individual requirements of the respective plastic and manufacturing process.

The second "Macroplastic" International Plastics Exhibition, is to be held at the Exhibition Halls, in Utrecht, Holland, during October 19-26, 1960. More than 600 internationally known firms from more than 20 countries, will be represented. The organizer of the event is again N. V. 'tRaedthuys, Amsterdam, who has arranged for exhibits to be shown in three halls. In the largest of these will be displayed raw and auxiliary materials, semi-manufactures, and industrial products; plant and equipment will be on view in the second hall; while the third will be devoted to exhibitions of an informative nature. The exhibition will be preceded by a World Congress on the Technology of Plastics Processing, to be held October 17-19, in the Royal Institute for the Tropics, Amsterdam. This Congress is sponsored by the Association for the Advancement of Knowledge of Materials, the Royal Institute of Engineers, and the Royal Netherlands Chemical Federation.

"MENARA PERKEBUNAN," Javanese-language successor to "De Bergcultures," reports a new approach to soil research and cultivation methods and growing rubber and other perennial crops. As explained in the English summary, the author has concluded from his studies that the CO_2 content of the layer of air between soil and leaves is very important for growth, especially in young plantations. CO_2 competition by ground cover means that dense ground cover can be as harmful to a rubber plantation as clean-weeding, according to the author; so the CO_2 factor should be carefully considered in the selection of cover or catch crops. He also suggests that competition for CO_2 is one of the reasons for decreased yields in older rubber plantations.

REVUE GÉNÉRALE DU CAOUTCHOUC devoted its entire October, 1959, issue to the problems of tire and road, dealt with at the International Symposium held at the Institute Français du Caoutchouc, May 20-21, 1959. The 23 papers submitted by specialists from nine different countries, are presented complete, with discussions, in French and English, side by side. They cover dynamics, slip, wear, rolling resistance, special tires and tests.



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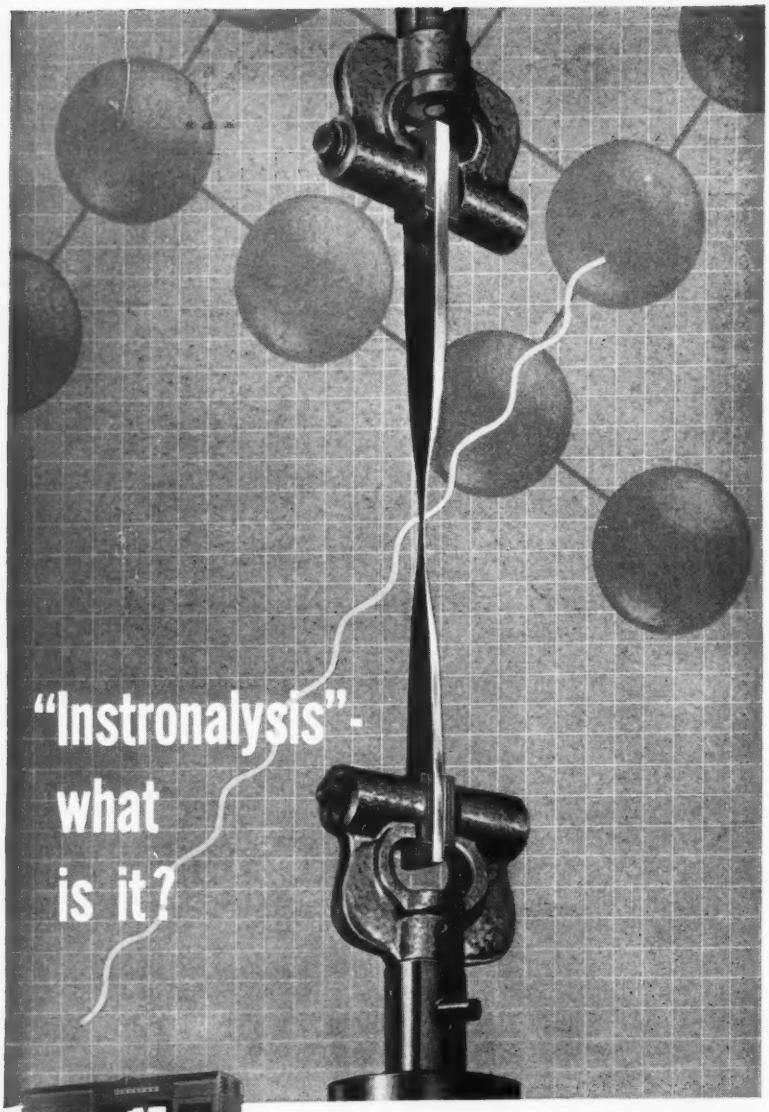
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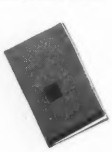
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News from Abroad

NEDERLANDSCHE DOW MIJ., a wholly owned Dow subsidiary, is to build and operate a new $6,000,000 butadiene-styrene latex plant in Rotterdam, Holland, it is reported. The plant is expected to go on stream early next year, and initial output is to be sufficient to cover growing needs of this latex in Western Europe.

BRAKESHOE INTERNATIONAL, S.A., wholly owned Swiss subsidiary of American Brake Shoe Co., New York, N. Y., has acquired industrial hydraulics firms in Belgium and England. Brakeshoe International is headquartered in Geneva, Switzerland. The Belgian acquisition is Hydrobel, S.A., a European leader in the field of hydraulics and pneumatics. The company designs and installs industrial hydraulic and pneumatic systems and manufactures specialized hydraulic equipment. The English firm is Deri (Engineers), Ltd., which manufactures industrial hydraulic pumps and motors and supplies hydraulic transmissions and liquid fuel pumps for special applications.

DUNLOP PLANTATIONS, LTD., reports the work of converting 20,000 acres of virgin bush in Eastern Nigeria into a rubber estate, started in 1956, is progressing favorably despite many difficulties. So far, 10,000 acres have been opened up, and tapping on the earliest plantings will begin in 1961. The entire area is being planted with high-grade stock which has yielded 1,800 pounds per acre in Malaya. However, in view of the uncertainty as to the effect on productivity of the irregular rainfalls in Eastern Nigeria, the estimate for annual yields has been put at a conservative 1,000 pounds per acre, which would give 10,000 tons a year for the whole area of 20,000 acres when it reaches maturity.

THE WESTERN NIGERIAN GOVERNMENT, as part of a new £165,000,000 five-year development plan, proposes to increase production of its three basic commodities: cocoa, palm oil, and, more particularly, rubber. Production of rubber has been rising steadily in quantity and quality and at current prices is expeced to increase by 10% in the next five years. To encourage further improvement of quality, the government is to begin the distribution this year of 2,500,000 clonal seedlings. A regional rubber research station, to cost £190,000, is also to be established; this may eventually be expanded into a federal or interterritorial institute. To promote outside interest in plantations, the Government has provided £1,000,000 for equity participation in such projects, and present restrictive regulations on production will be relaxed. The Western region also intends to set aside £6,750,000 to promote industrial development and to attract foreign investors.



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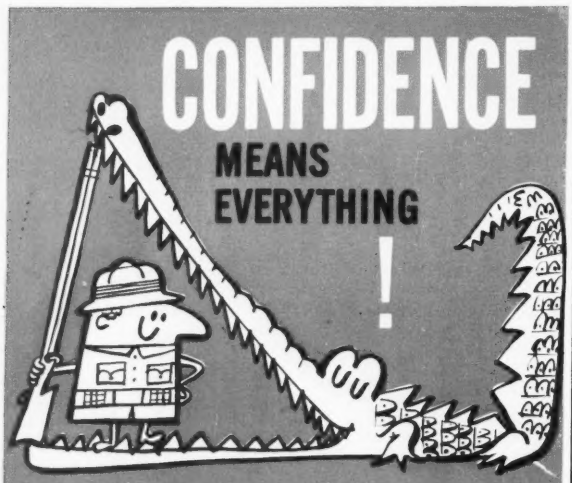
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TECHNICAL BOOKS

BOOK REVIEWS

"Chemical Engineering Catalog. 1960." Forty-fourth Edition. Cloth, 11 by 8½ inches. Reinhold Publishing Corp., New York, N. Y. 1680 pages.

This forty-fourth annual edition is designed for the chemical processes industry and provides completely indexed coverage on plants, processes, equipment, machinery, material, supplies, and services. All manufacturers' catalogs are collected in exact alphabetical order in one section of the catalog. Black and white pages are found in approximate alphabetical order in another section. An index section includes the following indices: a company catalog index; a functional guide; equipment and materials of construction index; engineering services index; trade names index; and a section pertaining to more information.

"Neues Gummi Adressbuch, 1959-60." Third Edition. Published by Curt R. Vincentz Verlag, P.O.B. 8, Hannover, Germany. Linen, 8¼ by 6 inches, 608 pages. Price DM 32.

The third edition of the New Directory for the German Rubber Industry follows the arrangement of the second edition, published in 1955, but has been completely revised and enlarged. Like its predecessor, the new directory covers manufacturers, dealers, suppliers of raw materials, importers, and sales representatives of foreign firms in the rubber and asbestos industry as well as manufacturers in the allied plastics, cable, and belting fields. The major part of the work consists of an alphabetically arranged geographical index of firms, giving details as to bankers, line of business, etc. There is also, besides an index of companies and list of associations, a buyers' guide with trade marks and brand names including almost 6,000 entries. This guide is divided into several parts covering raw materials, semi-manufactures, and finished goods, equipment, testing apparatus, and accessories. A separate section dealing with manufacturers of rubber and plastics machinery and equipment completes this useful directory of the German rubber and allied industries.

"Statistical Quality Control: An Introduction for Management." D. H. W. Allan. Hard bound, 5¼ by 7½ inches, 136 pages. Reinhold Publishing Corp., New York, N. Y., 1959. This book is designed for the manager who wishes to become familiar with statistical quality control (SQC) without the necessity of considering the mathematical details of the technique. The book discusses the individual methods and their objectives. It also outlines the duties of quality control engineers and extensively lists sources of information on particular programs. The purpose is to describe each method sufficient to the understanding of its aims and application.

Chapters include SQC objectives, SQC in the organization, some elementary statistical concepts, process capabilities, statistical control charts and acceptance sampling, and statistical methods for investigation and experimentation.

"Special Sources of Information on Isotopes." TID-4563 (2nd Rev.). United States Atomic Energy Commission, Washington, D. C. 51 pages. This revised booklet lists more than 300 informational references and their availability. The references were selected as the most comprehensive or informative items published on the nature and uses of radioactive and stable isotopes. Also included are a number of titles and the availability of translations of important foreign publications.



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Technical Books

NEW PUBLICATIONS

" 'Ridacto' Accelerator-Activator." Spencer Products Co., Inc., Ridgewood, N. J. 7 pages. The advantages and uses of this accelerator-activator are described. Included are typical formulas and vulcanizate test results.

"Eastman—Supplier for the Rubber Industry." Eastman Chemical Products, Inc., Kingsport, Tenn. 8 pages. This booklet describes the company's products used in the rubber industry including an antiozonant, antioxidants, adhesives, coatings, waxes, solvents, plasticizers, intermediates, and miscellaneous chemical products. Technical data and test results are included.

"Gas Fading Characteristics of Latex Antioxidants." S-160. Industrial Chemicals Division, Pennsalt Chemicals Corp., Philadelphia, Pa. 4 pages. This study was made to determine the behavior of latex compounds protected with Pennox A, C, and D antioxidants when the compounds are coated on, or otherwise in contact with, various fabrics. Procedures, test results, and a summary are included in the report.

"Automatic Electric Heat Transfer Systems." Radcor, Inc., Pittsburgh, Pa. 4 pages. A new series of automatic electric fluid heat transfer systems are described. Designated Type PF, the equipment is designed and factory prewired for simple hook-up to process equipment such as jacketed pipe lines and kettles, dies and molds, etc. Ten models are available in both standard and special voltages and phases.

"American Standard Safety Code for Head, Eye, and Respiratory Protection." Z2.1-1959. American Standards Association, Inc., New York, N. Y. 46 pages. The standard described in this booklet was designed to provide reasonable and adequate means, ways, and methods for the proper selection and safe use of head, face, neck, eye, and respiratory equipment. The standard applies to all operations or processes, excluding those relating to communicable air-borne diseases or radiation such as X-rays or high-energy particles.

Publications of the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.:

"Neoprene in 'Freon' Refrigerant Systems." BL-365. By F. W. Keeley. 4 pages. This report describes the compounding of Neoprene Type W as an elastomer for service in contact with "Freon" refrigerants. A compound formula is given which is compatible with this type of refrigerant system.

"Highly Extended 'Viton' Compounds." BL-366. By T. D. Eubank. 4 pages. Loadings of up to 200 parts of carbon black may be used to reduce the cost of "Viton" compounds. Polymeric ester plasticizers are needed to improve processing, lower hardness, and increase elongation. The presence of plasticizer tends to decrease the aging resistance of vulcanizates, but does not affect fluid resistance.

Publications of The British Rubber Producers' Research Association, Welwyn Garden City, Herts, England:

"Swelling and Viscosity of Rubbers in Mixed Solvents." No. 327. By G. M. Bristow and W. F. Watson. 14 pages. Swelling and viscosity measurements of natural rubber, some synthetic rubbers, polystyrene, and polymethylmethacrylate, in binary solvent mixtures are reported. Correlations between the two types of measurement are evident.

"The Reaction of Sulfur and Sulfur Compounds with Olefinic Substances. Part XII." No. 328. By L. Bateman, R. W. Glazebrook, and C. G. Moore. 14 pages. The effects of vulcanizing additives on the reaction of sulfur with 2,6- dimethylocta-2,6-diene, and their bearing on the mechanism of sulfur vulcanization of natural rubber are discussed. An introduction, experimental methods and results, a discussion, and a conclusion are given.

(Continued on page 30)

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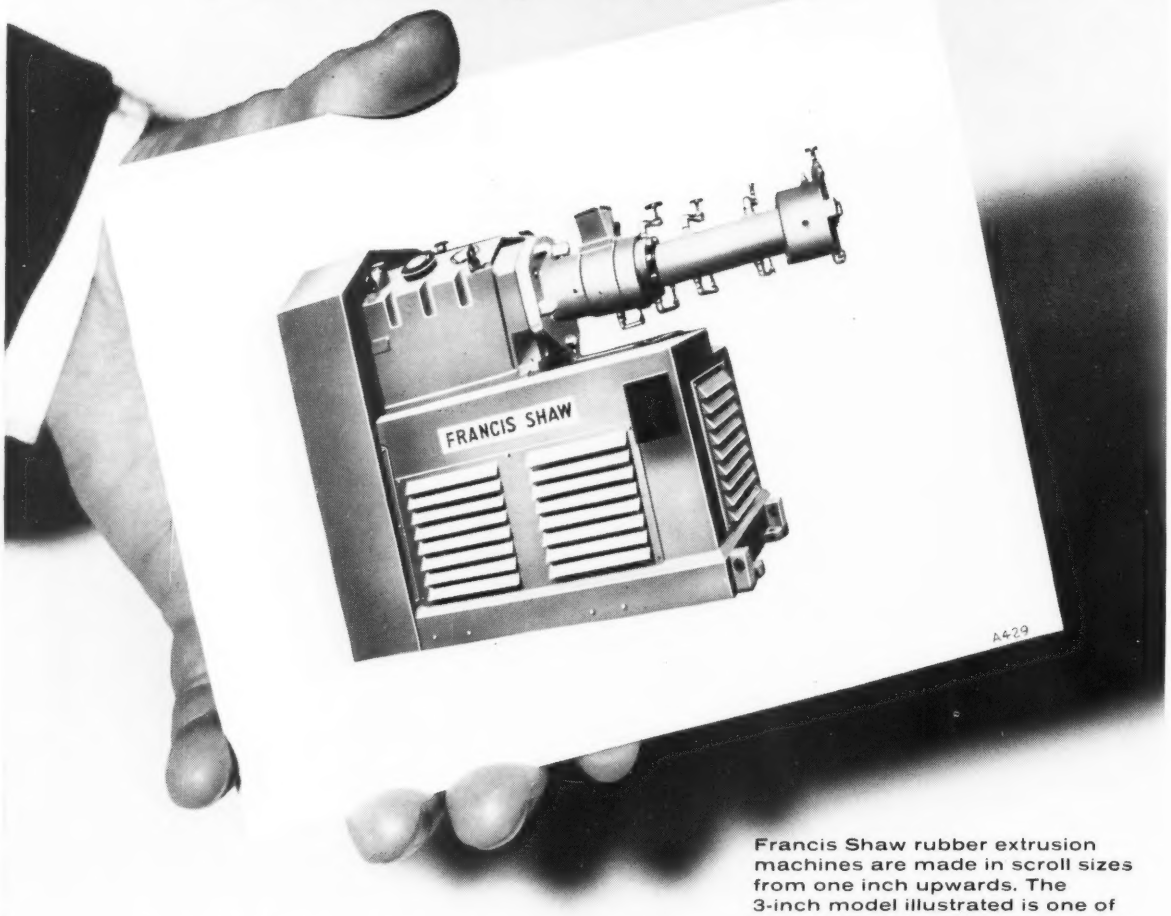
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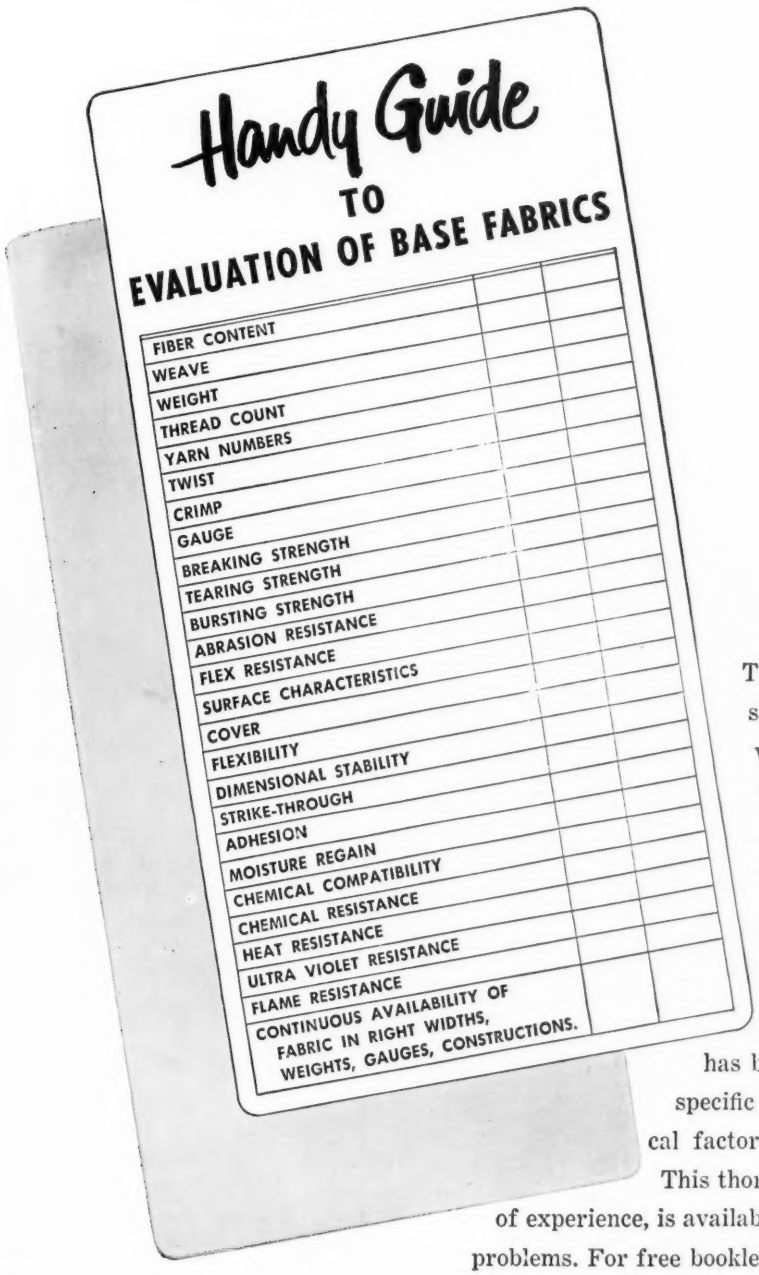
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P4391-2



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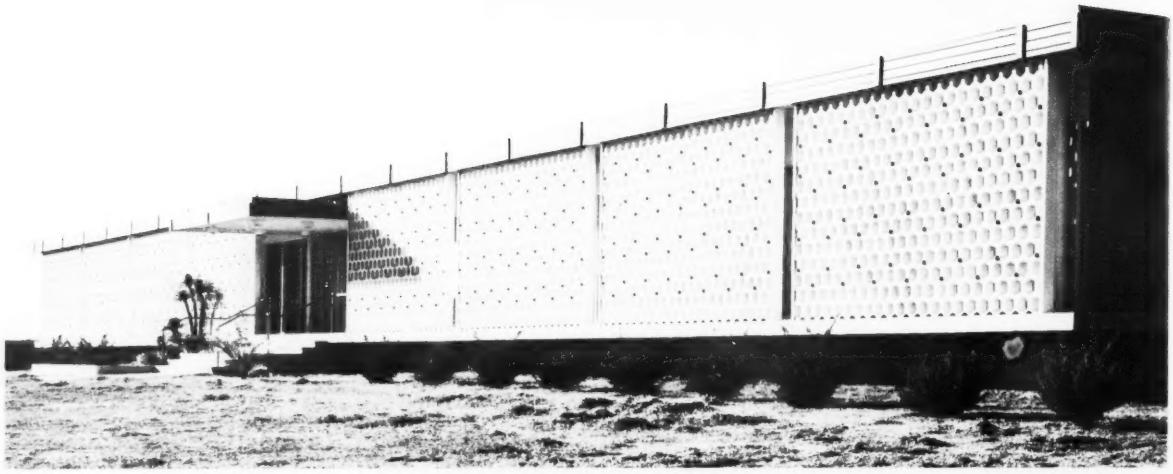
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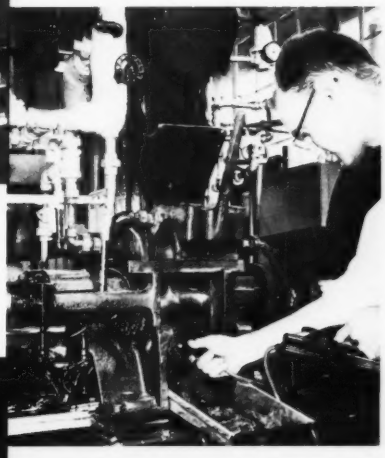
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3

A new rubber for tires?

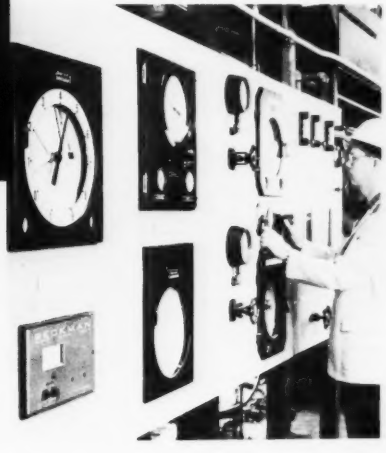
COPOLYMER
CRCC
RUBBER & CHEMICAL CORPORATION



4

Has it got what it takes?

Research and Development at Copolymer is dedicated to new and better products—prompt and competent service—for old and new customers. This spells progress for you — for Copolymer—for the country.



5

Can we make it commercially?

Copolymer RUBBER & CHEMICAL CORPORATION

Phone Elgin 5-5655 P. O. Box 2591, Baton Rouge, Louisiana

SALES OFFICES: Hartford, Connecticut; Atlanta, Georgia; Chicago, Illinois; Akron, Ohio; Philadelphia, Pennsylvania.



7540-A

No matter what your product, process or problem involving white pigmentation, look to TITANOX® pigments and our technical service for the answer. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments Ltd., Montreal.



Designed for confidence

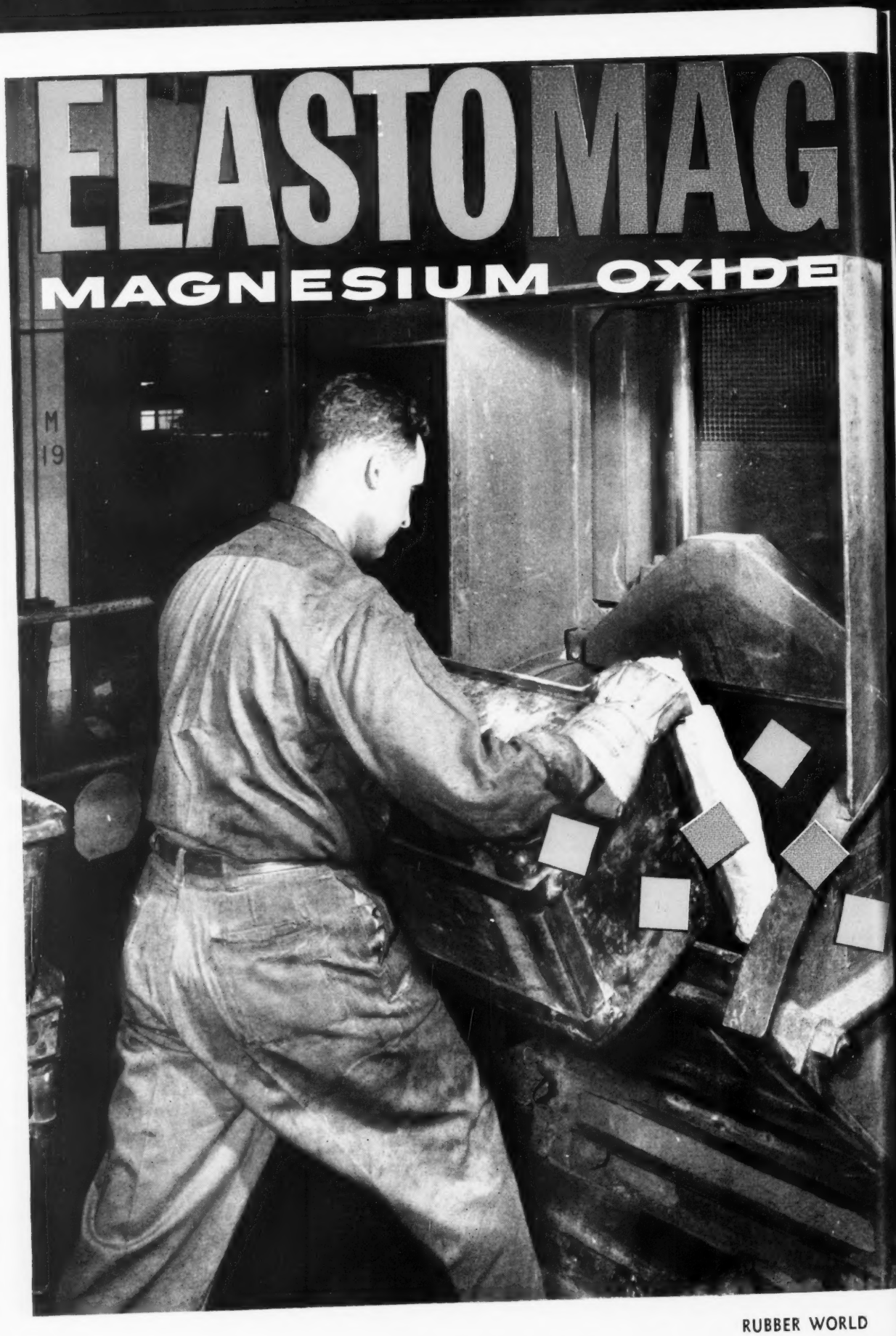
Picco Resins

You can specify Picco Resins with absolute confidence in the high quality of these fine hydrocarbon products. Carefully manufactured under rigidly controlled conditions in large quantities, their consistent uniformity assures trouble-free operation. Picco Resins are neutral thermoplastics, and are resistant to alkalies, salts and dilute acids. Their wide spectrum of utility is accentuated by stability and inertness.

The trademark of quality

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION
CLAIRTON, PENNSYLVANIA

Distributed to the Rubber Industry by HARWICK STANDARD CHEMICAL CO., Akron 5, Ohio


ELASTOMAG
MAGNESIUM OXIDE



...cuts throw-away losses from hot, scorchy stocks!

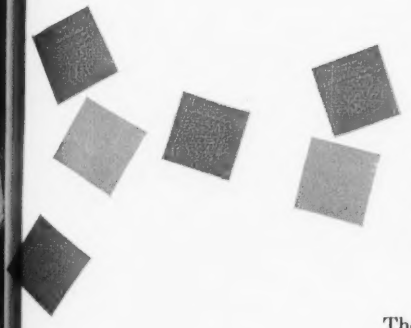
Morton's new activity-controlled oxides minimize scorch, improve bin stability ...give you higher-quality rubber

Pick the process safety you want . . . and get it *every* time with new Morton ELASTOMAG oxides! This new Morton development lets you use sensitive elastomer recipes without guesswork, or risk of loss! For the first time, you can predict process and curing aid performance with complete accuracy. This simplifies scheduling . . . boosts production . . . profits, too!

Three ELASTOMAG activity grades—high, medium, and low—make it easy to use sensitive recipes time after time without trouble. Each grade is held within extremely close limits on the Morton Activity Index scale for precisely predictable performance.

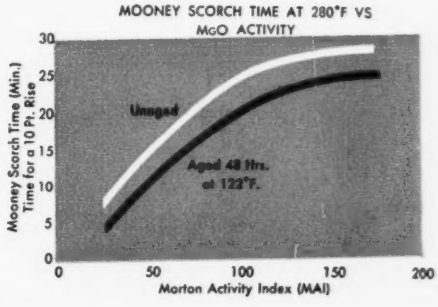
New Morton Activity Index (MAI) simplifies the use of magnesium oxide. It tells you the speed at which oxide will react . . . lets you choose an ELASTOMAG with the MAI value that provides best process safety, rate of cure, and state of cure. Morton researchers have proved that MAI—when used with oxides having superior dispersion—is a precision tool for predicting performance. Morton's new ELASTOMAG oxides are based on this research.

New ELASTOMAG Micro-Pellets—Dusting problems are minimized by Morton's new Micro-Pelletizing process. No binder or treating agent is used. In the mixer, Micro-Pellets break down to minute particles . . . provide the same superior dispersion as ELASTOMAG in the powdered form.



Predict process safety with new accuracy

Here's how Morton ELASTOMAG controls Mooney Scorch time. Notice how oxides with high Morton Activity Index (MAI) values give maximum safety. ELASTOMAG grades available have MAI ratings of 20, 100, and 170.



There's an ELASTOMAG oxide that can increase production in your plant. Ask your Morton Man for technical information and a copy of Morton's new ELASTOMAG bulletin. Distributors are listed below. Phone or write now.

Akron Chemical Company
255 Fountain Street
Akron, Ohio

Ernest Jacoby & Company
585 Boylston Street
Boston 16, Massachussetts

O'Connor & Company
4667 North Manor Avenue
Chicago 25, Illinois

H. M. Royal, Inc.
689 Pennington Avenue
Trenton, New Jersey

H. M. Royal, Inc.
11911 Woodruff Avenue
Downey, California

MORTON CHEMICAL COMPANY
110 N. Wacker Drive—Chicago 6, Illinois—Financial 6-6760

Photo courtesy of Chicago Rawhide Company

Technical Books

(Continued from page 20)

Publications of the Enjay Laboratories, Linden, N. J.:

"Compounding Enjay Butyl for High Damping at Low Hardness Levels." Technical Information Sheet #37. R. M. Cardillo. 3 pages. This data sheet presents compositions and properties of butyl stocks possessing high relative damping and low hardness for automotive dynamic applications. Formulations and test results are presented in two tables.

"Improved Stability of Butyl Latex Adhesive Dip." Technical Information Sheet #38. A. J. Wallace. 2 pages. A new butyl latex fabric adhesive compounding development with zinc oxide dispersion is described. A typical recipe and mixing procedure for a zinc oxide protected dip are given in a table.

"Screw Conveyors and Screw Feeders." Book 2989. Link-Belt Co., Chicago, Ill. 76 pages. This book is devoted to the versatile applications and selection of screw conveyors, screw feeders, and components. It illustrates more than 20 different types of screws, 14 types of troughs, with four types of covers, five types of discharge openings, and two types of feeders. This book also shows how screw conveyors are used for conveying and elevating, distributing, reclaiming, collecting, mixing, blending, agitating, aerating, heating, and cooling materials.

"Glass and Ceramics; Rubber Industries." National Safety Congress Transactions, Vol. 13, 1959. National Safety Council, Chicago, Ill. 44 pages. Papers presented during the rubber sessions included, "Safety Counselor in a Rubber Plant," Earl E. Goldsworth, The Gates Rubber Co.; "Dermatoses as Related to the Rubber Industry," R. A. Manning, The Goodyear Tire & Rubber Co.; "Your Safety Line for '59," Wayne L. Christensen, Ohio Division of Safety & Hygiene; "Safety Problems in Plant Maintenance," Richard T. Wise, B. F. Goodrich Footwear & Flooring Co.; and "Radioactive Problems in the Rubber Industry," John G. Wood, Tracerlab, Inc.

"Chemigum N600 Plasticizer Study." CG-42. Chemical division, The Goodyear Tire & Rubber Co., Akron, O. 16 pages. This Tech-Book Facts Bulletin reports the results of a recently completed plasticizer study involving Chemigum N600 nitrile rubber. Tabular and graphic data list the effects of various commercially available plasticizers on the original and aged physical properties of a Chemigum N600 test formulation loaded with HAF black.

"High Pressure Chempumps." Bulletin 1070-1. Chempump division, Fostoria Corp., Huntingdon Valley, Pa. 4 pages. This two-color bulletin describes the firm's high-pressure line of sealless leakproof pumps. Operation, performance, engineering data, illustrations, and specifications are given.

"Lapp Pulsafeeder Metering Pumps." Catalog 59. Lapp Insulator Co., Inc., LeRoy, N. Y. 28 pages. This catalog describes the use of Pulsafeeder metering pumps in a variety of process industries to solve problems where hard-to-handle chemicals or accurate metering is involved. The catalog also includes the following information: how the Pulsafeeder can be used; types of hard-to-pump fluids which the metering pumps can handle; details (with drawings) on how the Pulsafeeder works; and various-type reagent heads available for effective metering of difficult fluids.

"Industrial Dryers and Ovens." Bulletin ID-300. J. O. Ross Engineering, Division of Midland-Ross Corp., New York, N. Y. 4 pages.

"Environmental Testing and Constant Temperature Equipment." Catalog No. 560. American Instrument Co., Inc., Silver Spring, Md. 41 pages.

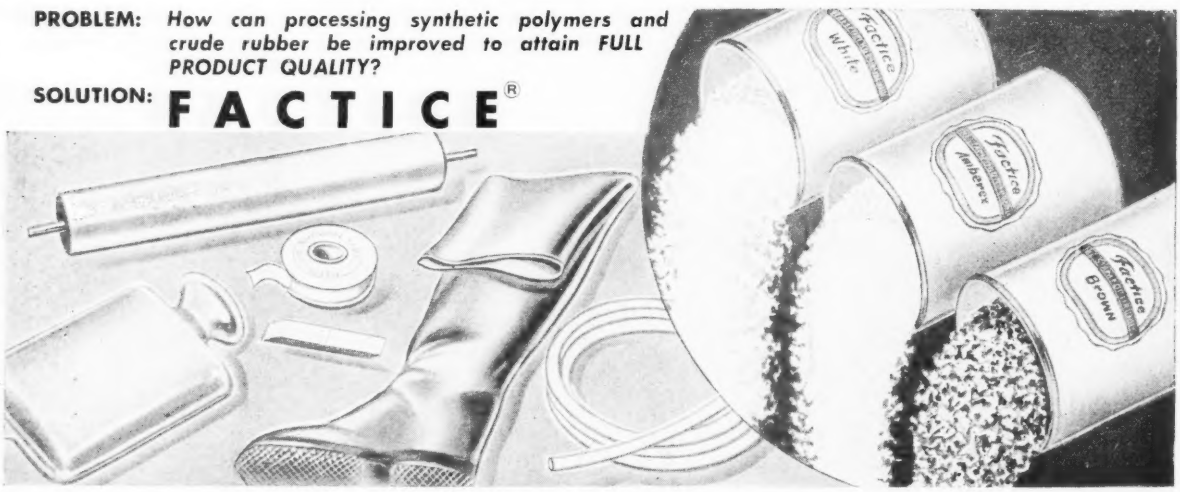
"Denison Equipment in Applied Hydraulics." Bulletin 220. Denison Engineering Division, American Brake Shoe Co., Columbus, O. 72 pages.

"Apex Fiber-Glass Air Brake Tanks." Apex Reinforced Plastics, Cleveland, O. Folder.

"Genafoam Expanded Polystyrene Foam Board." General Foam Plastics Corp., Portsmouth, Va. 12 pages.

PROBLEM: *How can processing synthetic polymers and crude rubber be improved to attain FULL PRODUCT QUALITY?*

SOLUTION: **FACTICE®**



FACTICE®. . . ***highest quality vulcanized vegetable oils have solved many of these problems . . .***

LET US HELP YOU IN SELECTING THE TYPE FOR YOUR NEEDS

Factice — THE STAMFORD RUBBER SUPPLY CO. — Vulcanized Oil

NOTE THESE OUTSTANDING QUALITIES: Rapid incorporation rate. Facilitates pigment dispersion. Prevents the sagging of extruded goods and stock contraction previous to cure. Dries out sticky compounds and prevents their adhering to mill and calender rolls. Improves low temperature flexibility. Prevents sweating where stocks are heavy in processing oils. Good aging qualities. Compatible with neoprene, crude, and SBR. FACTICE is supplied in white, amber and brown.

Feel free to submit your problems to us. Data on request any time.

The STAMFORD RUBBER SUPPLY CO.
Stamford, Conn.

how to vastly increase the useful life of rubber...

Consider the effect of your curing system on the effectiveness of a chemical antiozonant

In compounding rubber, use of a potent antiozonant like UOP 88 or 288 is essential in assuring maximum crack-free life. But do you realize what a vast difference may be made by your *curing system?*

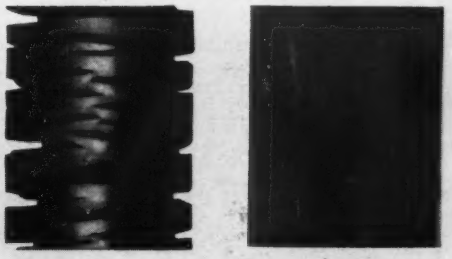
Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems —a vast increase in resistance to cracking!

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants is available through UOP facilities and technical personnel. Just write or telephone our Products Department.



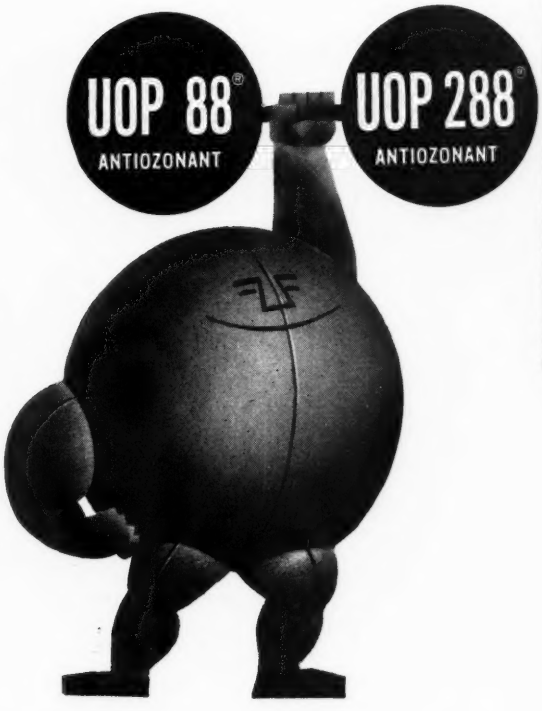
UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.



UOP® UNIVERSAL OIL PRODUCTS COMPANY

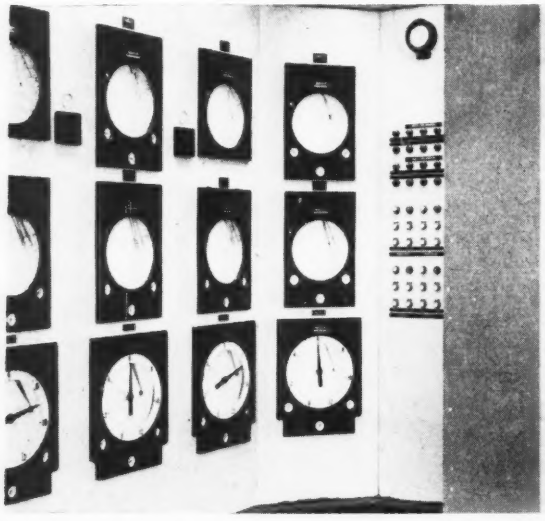
30 Algonquin Road, Des Plaines, Illinois, U. S. A.

WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

QUALITY PRODUCTION CONTROL PROTECTS YOUR **CARBON BLACK** DOLLAR AT WITCO-CONTINENTAL

At Witco-Continental, experienced personnel control carbon black production with modern instrumentation techniques and complete laboratory testing. As a result, Witco's fully automated controls yield a continuously uniform product.

Furthermore, because Witco laboratories are located at plant sites, immediate testing results in faster production schedules. So, when you purchase carbon blacks, be sure you insist on highest quality—insist on WITCO-CONTINENTAL.





Centralized instrument panels, part of the fully instrumented production controls in use at Witco-Continental, record the continuous operating conditions in the plant. Temperature control points, recorders and automatic alarm systems evaluate and control conditions to assure a constantly uniform product. Start-up and shutdown for cleaning operations are push-button procedures.



Feed stock meters critically control hydrocarbon feed... play a vital part in the achievement of uniformity of black properties. Here, an operator conducts a routine inspection.





As a final check on production control, physical testing of the black itself and testing in rubber are performed by highly skilled rubber technicians. Witco's modern plant site laboratories make possible on-the-spot testing geared to the continuous production of carbon black that meets customer requirements. Test results are fast. There is no lag between production and evaluation. Production control is constant and uniform.





WITCO CHEMICAL COMPANY, Inc.
CONTINENTAL CARBON COMPANY

122 East 42nd Street, New York 17, N. Y.

Sales Offices in Chicago • Quincy-Boston • Akron • Atlanta • Houston • Los Angeles • San Francisco • Toronto and Montreal, Canada (Soden Chemicals Division) • London and Manchester, England • Glasgow, Scotland • Rotterdam, Holland

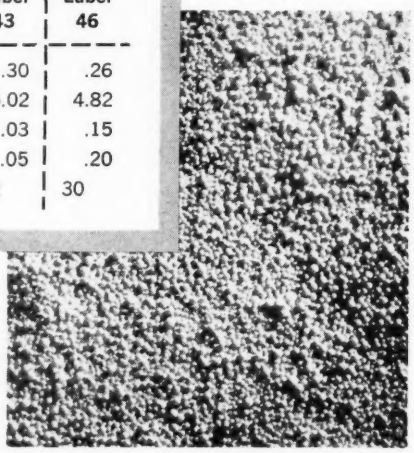
FOR LATEX COMPOUNDING...

ST. JOE Now Offers Producers

5 ZINC OXIDE GRADES

of *Electronically-Controlled* Purity and Uniformity

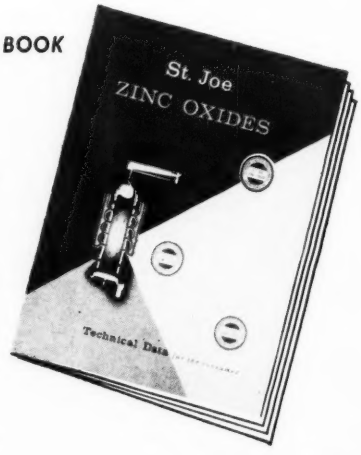
Grade	Black Label 20	Red Label 30	Green Label 12	Green Label 43	Green Label 46
Ave. Particle Size D1—Microns	.20	.23	.24	.30	.26
N_2 Specific Surface—Sq. M/gram	10.91	7.04	6.10	5.02	4.82
Acidity as SO_3	.03	.03	.03	.03	.15
Total S as SO_3	.05	.05	.05	.05	.20
Apparent Density—Lbs./cu. ft.	25	28	30	32	30



ALL ST. JOE LATEX GRADES are also available in the form of free-flowing, dustless pellets, having approximately double the apparent density of the powdered grades.

The pelletization process removes a large amount of gas from the ZnO particles. If not removed, this gas tends to become entrapped, adsorbed, and may emulsify and react with the dispersing agent, greatly increasing the viscosity of the slurry. The use of pellets also means less dusting and better housekeeping in the factory. Because of the greater apparent density of the pellets, *a considerable saving in warehouse space can be realized.*

For further information, write for ST. JOE'S 48-PAGE TECHNICAL DATA BOOK



LEAD-FREE ST. JOE ZINC OXIDE

ZNO-183

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE

NEW YORK 17. N. Y.

Plant & Laboratory:

Monaca (Josephtown), Pa.

A Leading Producer Of Quality

Zinc Oxides For Over 30 Years.

Naugatuck PARACRIL OZO

THE OIL-RESISTANT, OZONE-RESISTANT NITRILE RUBBER



...tough, oil-proof, weather-proof and **colorful, too!**

The samples above should begin to give you some idea of the endless color possibilities in ozone-resistant rubber products made of new PARACRIL® OZO. Now you can give your product color that *sells*... color that identifies for coding wire and cable jacketing... color that blends or *contrasts*... color that works in a hundred ways. And you can give your product other superior properties, too.

Along with color, new weather-resistant PARACRIL OZO gives you a combination of high abrasion resistance, oil resistance, flex life and other valuable rubber properties far surpassing conventional weather-resistant rubbers.

Cast a new eye on the rubber product you make or buy. See the difference color makes. See your Naugatuck Chemical Representative or write the address below for full information on PARACRIL OZO and the advantages it offers.

Naugatuck Chemical

Division of United States Rubber Company

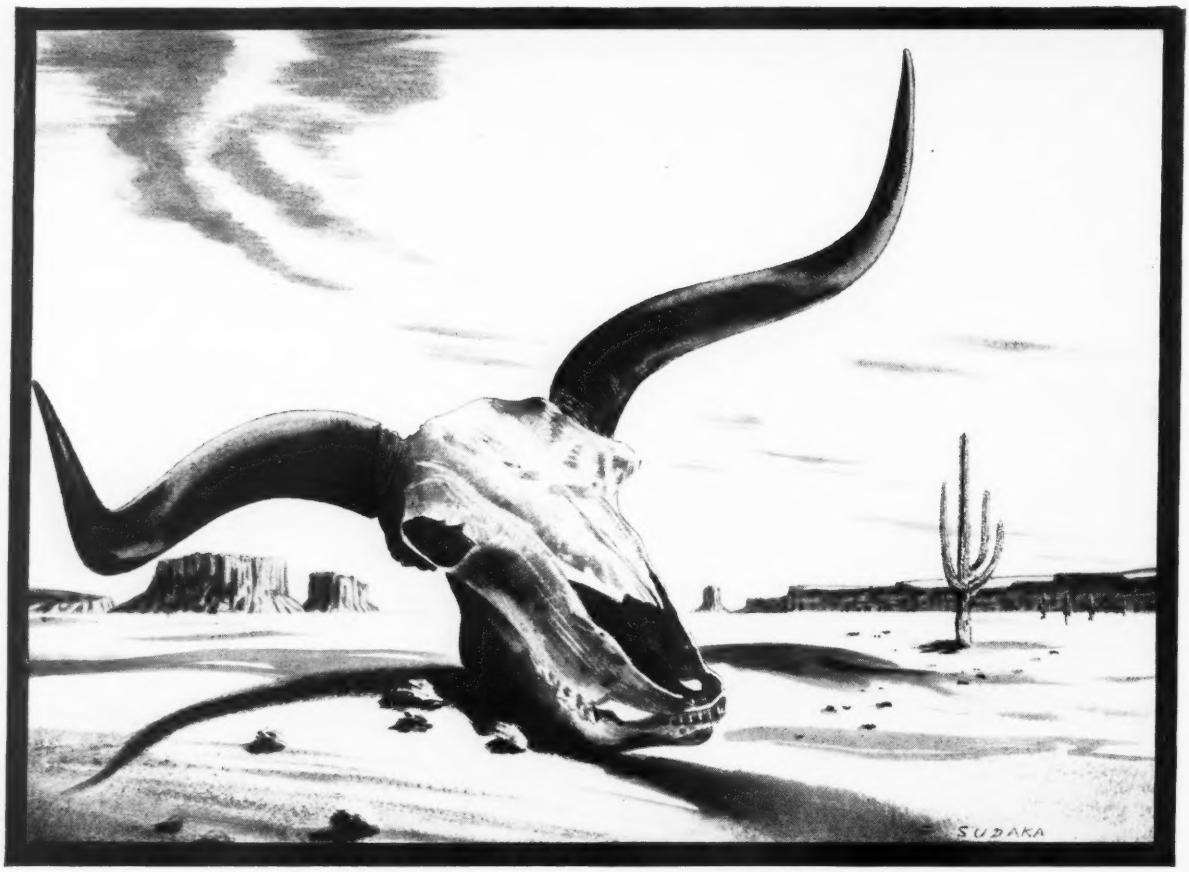
Dept. A Elm Street
Naugatuck, Connecticut

US RUBBER

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Naugatuck NAUGAPOL

specially processed R-S rubber



bone dry

...always!

A BONE parching on the desert couldn't hold much less moisture than a rubber product made of NAUGAPOL®. All 6 "hot" types (1016, 1018, 1019, 1021, 1022 and 1023) and both "cold" types (1503 and 1504) of Naugapol are *specially processed for low moisture absorption* by eliminating salt as a coagulant following polymerization. Extra straining and milling further help to produce salt-free elastomers characterized by:

- **LOW MOISTURE ABSORPTION**
- **HIGH DIELECTRIC PROPERTIES**
- **CLEANLINESS & UNIFORMITY**
- **EASE OF PROCESSING**

That's why NAUGAPOL butadiene-styrene polymers are so strongly preferred by manufacturers of rubber-insulated wire and cable, mechanical rubber goods and other rubber products requiring high electrical insulating qualities and excellent mechanical characteristics over a wide temperature range. Many grades of NAUGAPOL are non-discoloring, Polygard®-stabilized polymers suitable for the finest transparent, white or color-pigmented products.

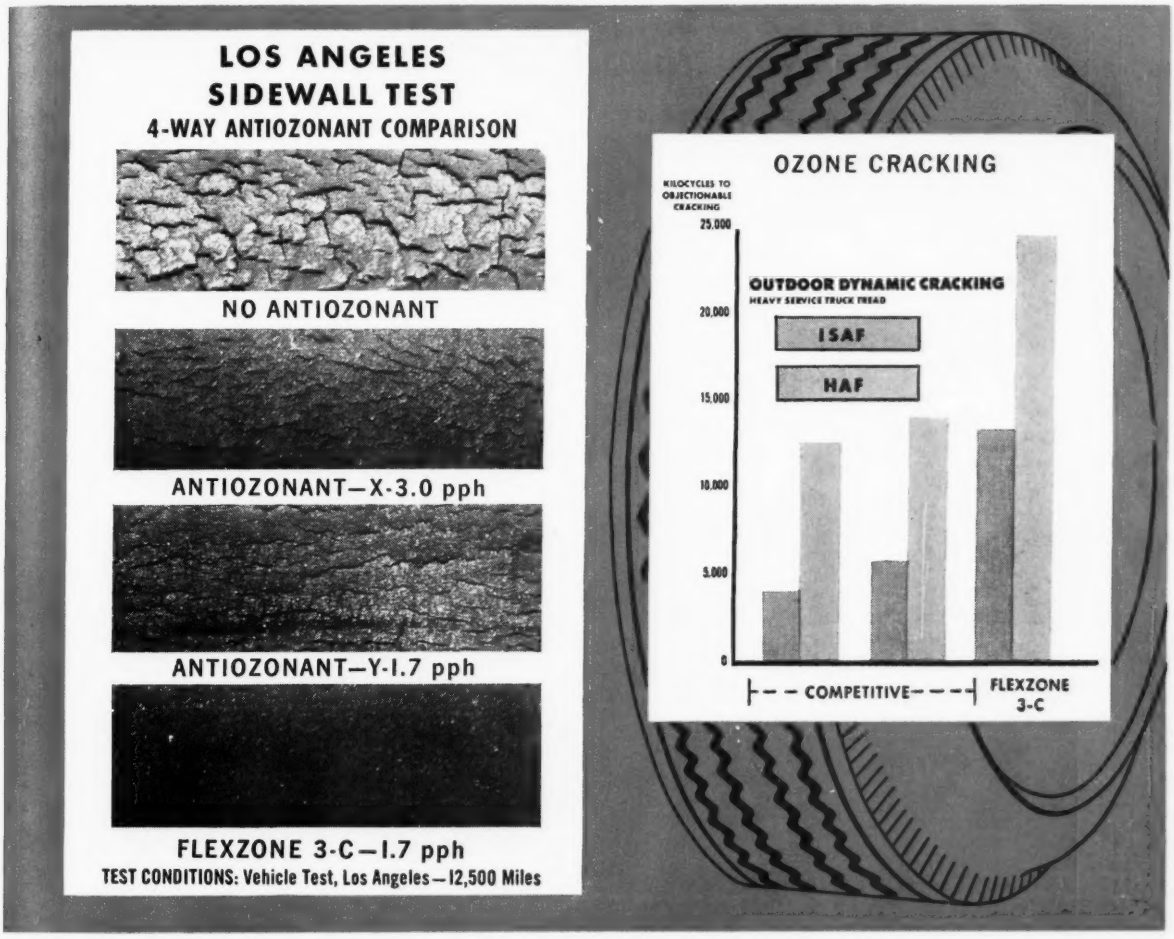
Naugatuck Chemical

Division of United States Rubber Company 410 Elm Street Naugatuck, Connecticut

US RUBBER

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

NAUGATUCK FLEXZONE 3-C



TRIPLES A TIRE'S FLEX LIFE

most effective antiozonant-antioxidant ever developed

Naugatuck Chemical now offers rubber compounders, processors, and end product users a chemical providing the best combination of resistance to

- **Ozone and Weather**
- **Flex fatigue**
- **Oxygen**
- **Heat**
- **Copper poisoning**

Dynamic outdoor tests have proved that tires protected with Flexzone 3-C surpass all others in:

- **dynamic cracking by 100%**
- **flex-crack growth by 300%**
- **ozone cracking by 50%**

In *heavy-service nylon truck tires* Flexzone 3-C is the most effective inhibitor of groove cracking and cut growth.

Flexzone 3-C is

- **in easy-to-disperse flake form**
- **relatively non-migratory and non-volatile**
- **effective in natural and SBR**
- **not adversely affected by carbon blacks, plasticizers, accelerators, or other normal compounding ingredients.**

For a finer rubber product, fewer adjustments and greater customer satisfaction, enjoy the protection only FLEXZONE 3-C offers. For samples, complete data, and technical assistance, contact your nearby Naugatuck Representative now.

Naugatuck Chemical

Division of United States Rubber Company 410B Elm Street Naugatuck, Connecticut

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NAUGATUCK

LOS ANGELES SIDEWALL TEST: 8.00-14 SIZE TIRE

4-WAY ANTIOZONANT COMPARISON

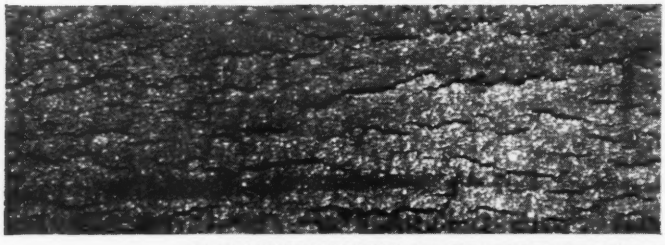
NO ANTIOZONANT

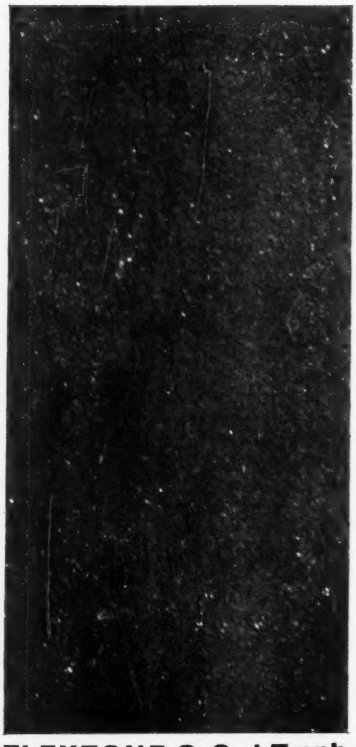


ANTIOZONANT–X-3.0 pph



ANTIOZONANT–Y-1.7 pph





FLEXZONE 3-C–1.7 pph

TEST CONDITIONS: Vehicle Test, Los Angeles–12,500 Miles

NEW FLEXZONE 3-C

Naugatuck Chemical now offers rubber compounders, processors, and end product users a chemical providing the best combination of resistance to

- **Ozone and Weather**
- **Oxygen**
- **Flex fatigue**
- **Heat**
- **Copper poisoning**

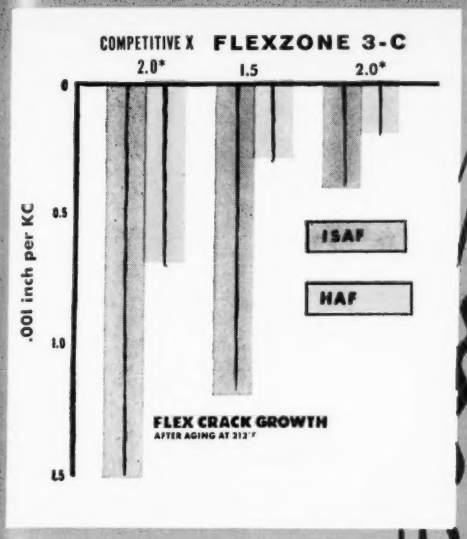
Dynamic outdoor tests have proved that tires protected with Flexzone 3-C surpass all others in:

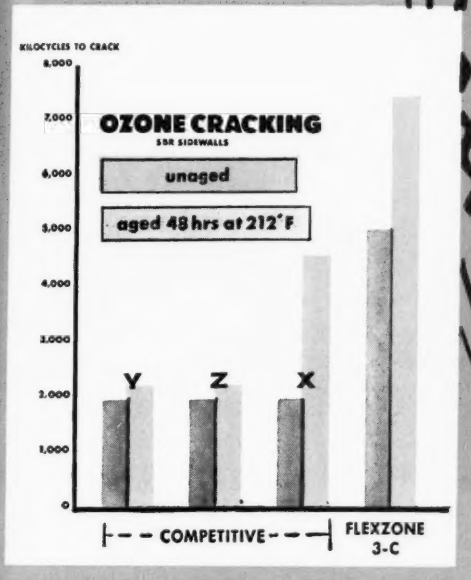
- **dynamic cracking by 100%**
- **flex-crack growth by 300%**
- **ozone cracking by 50%**

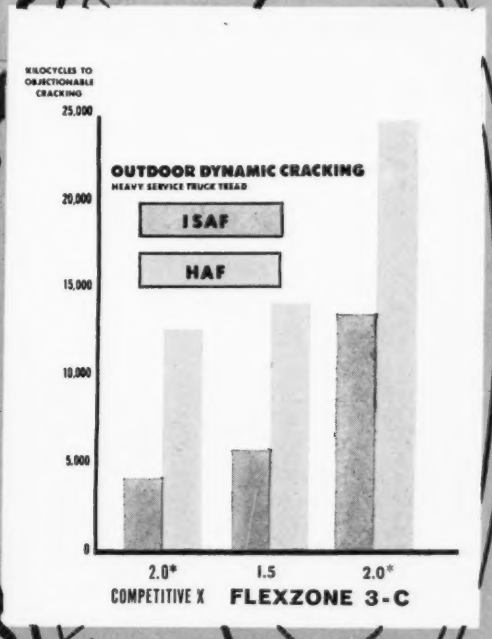
In *heavy-service nylon truck tires* Flexzone 3-C is the most effective inhibitor of groove cracking and cut growth.

Flexzone 3-C is

- **in easy-to-disperse flake form**
- **relatively non-migratory and non-volatile**
- **effective in natural and SBR**
- **not adversely affected by carbon blacks, plasticizers, accelerators, or other normal compounding ingredients.**







The above comparisons are made against materials classed as true antiozonants and not simply standard antioxidants.

*These contain 1.6 parts additional antioxidants.

The most effective antiozonant-antioxidant ever developed...triples a tire's flex life

For a finer rubber product, fewer adjustments and greater customer satisfaction, enjoy the protection only FLEXZONE 3-C offers. For samples, complete data, and technical assistance, contact your nearby Naugatuck Representative now.

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The only explanation I have is that he must be in the neoprene business—and knows that MAGLITE is the key to superior scorch protection.

Maglite®

The performance-proved magnesium oxide

Want to eliminate scorch damage in neoprene processing? Specify MAGLITE D. Tests prove that it offers better scorch protection for neoprene than any other magnesium oxide you can use. MAGLITE D also helps solve storage problems since it occupies about one-third the warehouse space as many of the lightweight magnesias. The benefits of using MAGLITE K, M, or Y for other elastomers and certain product or process requirements are equally impressive. For samples and technical information write to



MERCK MARINE MAGNESIUM DIVISION

MERCK & CO., INC. • RAHWAY, N.J.

DISTRIBUTORS:

THE C. P. HALL CO. • WHITTAKER, CLARK & DANIELS, INC.

NEW MATERIALS

Heavy Calcined Magnesites 510, 595

Two new grades of heavy calcined magnesites have been added to the line made by General Magnesite & Magnesium Co., which are distributed by Harwick Standard Chemical Co., Akron, O. A typical analysis of these two new grades, No. 510 and No. 595, follows.

Ignited Basis % Typical	Heavy Calcined Magnesite 510	Heavy Calcined Magnesite 595
MgO	92.0	95.9
SiO_2	2.5	1.0
Fe_2O_3	0.8	0.6
Al_2O_3	0.7	0.5
CaO	3.9	2.0
Cl	0.05	0.05
Cr_2O_3	0.025	0.025
MnO	0.0015	0.0015
Boron	40 ppm.	40 ppm.
Color	tan	light tan
Screen, through 325	99%	99%
200	100%	100%
Bulk density compacted	55 lbs./cu. ft.	45 lbs./cu. ft.

Samples and further information on these two new grades are available from Harwick Standard Chemical Co.

Improved "Fluorel" KF-2141 Elastomer

Significant improvement in workability of a highly-fluorinated elastomer that is rated for service above 400° F. and resists corrosive chemicals has been announced by Minnesota Mining & Mfg. Co., St. Paul, Minn.[1] The improved product retains the name "Fluorel" KF-2141 Brand Elastomer, introduced a year ago, although the new version has a Mooney scorch rating almost three times that of the original product. It provides a fast cure with good heat aging qualities, reports 3M. Also it retains all other characteristics including low compression set after curing.

Applications for "Fluorel" elastomer have included O-rings, gaskets, and seals for high-temperature systems conveying acids and bases, solvents, and oils and fuels. With improved gum, many of these parts can be produced with greater ease of molding and fewer rejects.

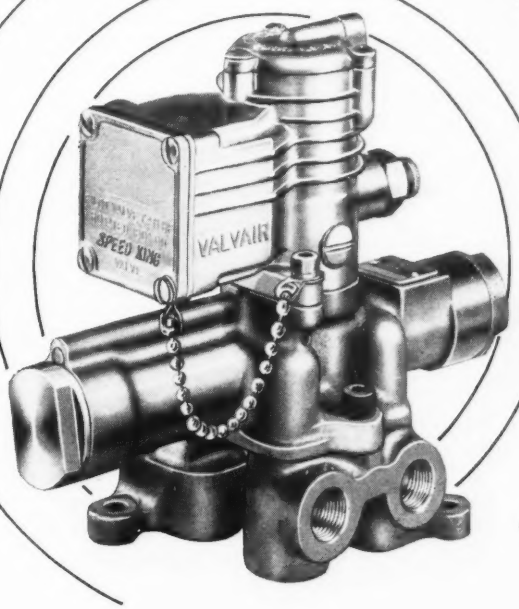
The cured elastomer meets military specifications MIL-R-25897A requiring a tensile strength that does not decrease more than 35% after aging for 16 hours at 600° F. Other characteristics include: (1) excellent resistance to JP-4 aromatic fuel, nitric acid (90%), carboxyl compounds, aldehydes, and type A transmission oil; (2) no cracking in 200 hours' exposure to ozone at 150 ppm. by the bent-loop method; (3) the elastomer is non-flammable and resists combustion even when applied to flammable fabrics; and (4) it can easily be bonded to metals by standard press and curing methods, producing a rubber-to-metal bond strength of 50 psi.

Products made with the elastomer can be used in continuous service at temperatures in excess of 400° F.; exposure to temperatures above 600° F. can be tolerated for limited periods.

[1] RUBBER WORLD, Nov., 1959, p. 252.

(*Continued on page 44*)

No coil burnout with SPEED KING®



...pilot operated control valves

• Built to JIC standards • interchangeable pilots • choice of mounting types, optional features • ac or dc, any voltage • ¼ to 1 in. NPT

SPEED KING solenoid pilot coils, potted in molded resin, are unconditionally guaranteed against coil burnout for the life of the valve! And, Speed King pilots are totally enclosed, and sealed against entrance of dirt or moisture . . . valves are fully air-operated for speed and dependability . . . feature a hard-chrome plated stainless steel plunger floating in O-rings, to eliminate wear-producing metal-to-metal contact.

For multi-million cycle dependability, specify Valvair® SPEED KING control valves.

Write for free Bulletin SK-100. Address: Valvair Corp., Akron 9, Ohio, Dept. RW-460

Valvair AKRON 11, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Andersen Co., Cleveland, Ohio.

8111

A NEW SYMBOL

United Carbon Company
and its subsidiaries:

United Producing Company, Inc.

United Rubber & Chemical Company

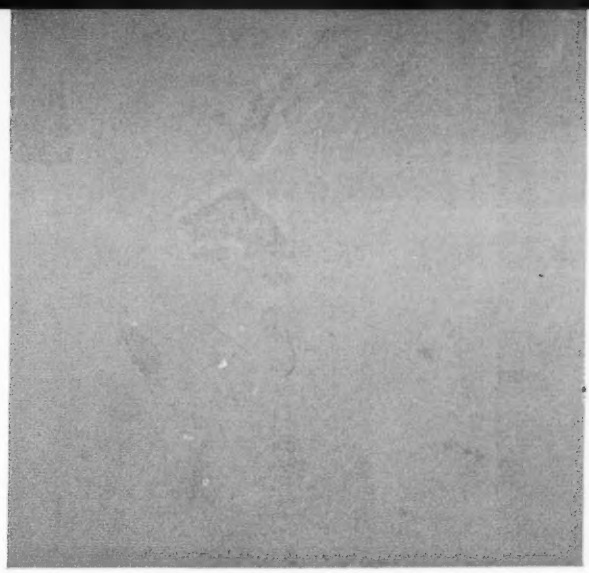
and

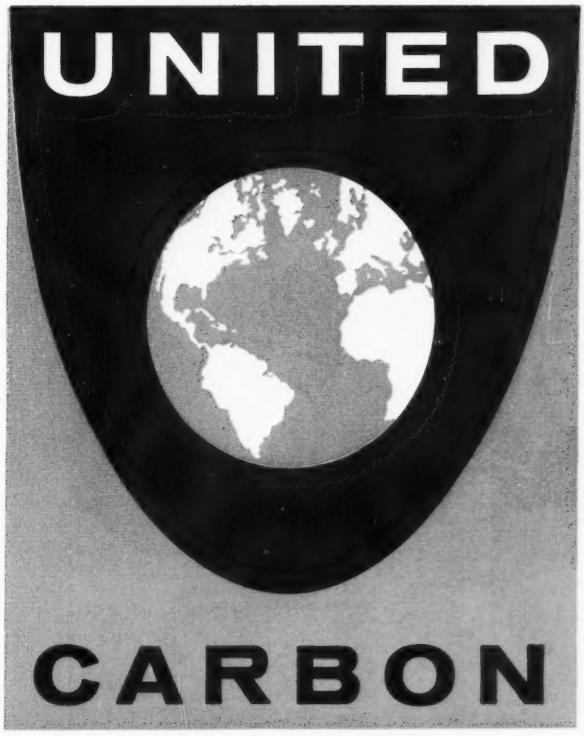
United Carbon Company, Inc.

take pleasure in presenting this new trademark. It is our hope that United's products and services to the rubber, paint, plastics, ink, oil and gas industries will cause this new symbol to take a place among the respected trademarks of international industry.

United Carbon Company
and its subsidiaries
produce and market:

Carbon black, synthetic rubber black masterbatches, crude oil and natural gas.





UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.

A Subsidiary of United Carbon Company

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Warehouse Stocks

WHITTAKER®

Whittaker, Clark & Daniels, Inc.
100 Church St., New York, N. Y.

New Materials

(*Continued from page 40*)

Regal 300, 600 and SRF Carbon Blacks

Regal is the name of a new family of carbon blacks now being produced on a world-wide basis by a new exclusive manufacturing process from oil by Godfrey L. Cabot, Inc., Boston, Mass. Three new Regal grades are commercially available at present.

Regal 300 is a channel replacement oil black, combining virtually identical channel black properties with the faster curing rate of HAF types. Comparable with EPC black in modulus, elongation, and tensile strength, Regal 300 has reportedly outperformed channel blacks in wear and tear resistance, cracking and chipping, in passenger-car tire and truck-tire road tests. Regal 300 is recommended for highway, off-the-road truck, and passenger-car tire treads, and tread rubber, where service requires typical channel black resistance to tearing, cutting, and chipping.

Regal 600 is a new type of oil furnace black, giving low hardness and low modulus in passenger-car tire treads and tread rubber for quieter ride and better traction properties, combined with the excellent tread wear resistance of an ISAF black, according to Cabot. Regal 600 is said to have outperformed ISAF black in cold SBR, oil-extended SBR, and natural rubber, by giving lower modulus and hardness, lower heat generation, higher electrical conductivity, and superior cut growth resistance.

Regal SRF is a semi-reinforcing furnace black made from oil, which is interchangeable with gas-produced SRF, giving physical properties and processing characteristics equal to those of gas-SRF blacks. Regal SRF is said to give equivalent modulus, hardness, tensile strength, elongation, tear resistance resilience, and compression set in natural rubber, SBR, butyl rubber, neoprene, and nitrile rubber.

Free samples and technical reports, RG-103, RG-104, and RG-105, are available from the company.

Pennsalt RC-2525 Fluorocarbon Resin

A new fluorine-containing thermoplastic resin, designated RC-2525 Resin, is now being produced in sizable pilot-plant quantities by the Pennsalt Chemicals Corp., Philadelphia, Pa. The resin is a crystalline high molecular weight polymer of vinylidene fluoride, containing more than 59% fluorine by weight. Its properties are strongly influenced by the stability and inertness characteristic of highly fluorinated hydrocarbon structures.

The new polymer is said to have high resistance to heat, light, and chemicals, superior mechanical strength and toughness, high degree of thermal stability, resistance to corrosive chemicals and solvents, stability under strong ultra-violet radiation and extreme weather conditions, plus the added advantages of being easy to fabricate. Tests also show that the resin has high impact resistance, does not shatter at low temperatures, has flexibility and long life in environments which degrade less stable materials.

This material is expected to find wide use in the production of pipes, tubings, seals, gaskets, and packings for chemicals and food processing plants, oil refineries, pulp and paper mills, and other plants using corrosive materials. Additional applications are seen in such industries as aircraft and missiles, automotive, electrical, and construction.

Suitable for all methods of fabrication, RC-2525 Resin can be used effectively in film for packaging, in coatings for wire, and in sheets for a variety of products. It can be fabricated into intricate shapes, sheets, rods, and tubes by compression molding, injection molding, and extrusion. Dispersions of the resin can be applied by spray coating and casting techniques to form thin protective coatings over metals and fabrics. This resin laminates to wood, metal, and other plastics.

Pennsalt reports that field evaluation by selected plastics fabricators and end-product users will provide further data on the usability of RC-2525.

(*Continued on page 68*)



Newest best seller...soles of Ameripol Rubber

To rubber soling's well known virtues of durability and economy you can now add another advantage—exceptional appearance and smooth feel. As a result, this new product of Bearfoot Sole Company is enjoying spectacular sales in the quality, dress shoe market.

The new look is achieved by the use of advanced finishing techniques with a new rubber polymer—Ameripol 4600. Since the process demands that only a minimum of pigment may be used, the uniformity of color and texture must be inherent in the rubber raw material. Ameripol 4600 consistently meets the stringent requirements—and cuts processing costs in the bargain.

If you make or use rubber products, it's wise to check Goodrich-Gulf. We produce the broadest range of polymers in the industry, and stress the individual technical services that can help *you* make improvements. Contact Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

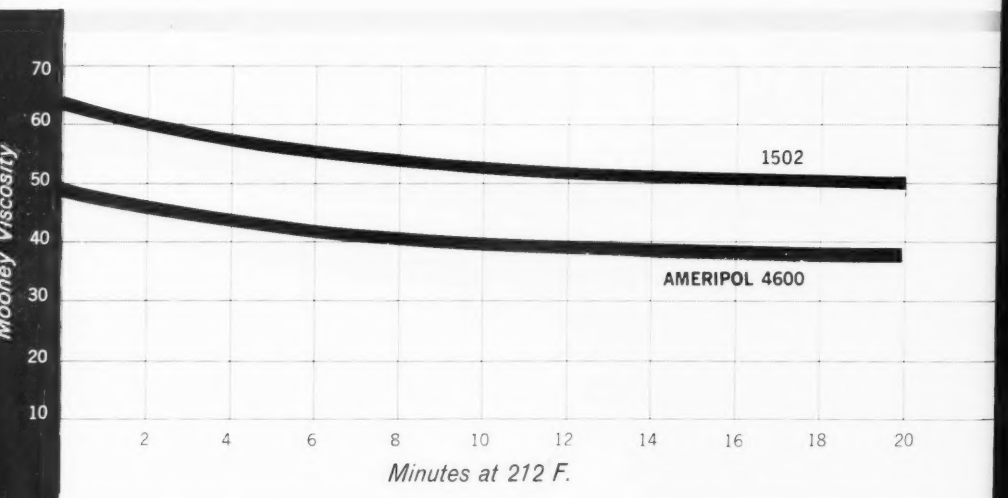


CUT YOUR PROCESSING COSTS WITH NEW AMERIPOL 4600

shorter breakdown - faster cure - with new low Mooney polymer

MOONEY BREAKDOWN CURVES

Samples not premilled



Time is money—and Ameripol 4600 is a new Styrene-Butadiene Rubber specifically designed to reduce the fabricator's processing time.

Ameripol 4600 reduces breakdown time by virtue of its significantly lower viscosity—in the 36-48 Mooney range. Time is saved in the mixing cycle, power requirements are reduced, extra wear and tear on machinery eliminated.

Ameripol 4600 is lighter in color than 1502 type polymers and is ideal for white or light colored products, such as shoe soles, floor tile, sponge, white sidewalls, sport shoes and household goods. And the reduction in processing time helps you control color.

TEST RECIPE

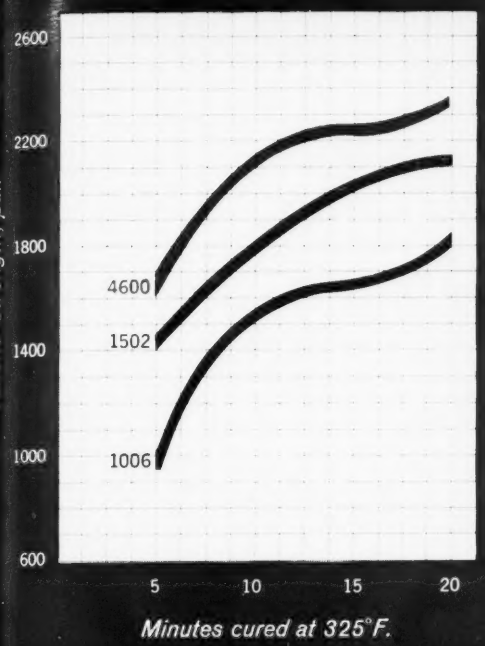
SBR 1502	100		
Ameripol 4600		100	
SBR 1006			100
Zinc Oxide (lead free)	3	3	3
Hydrated Silica	30	30	30
Diethylene Glycol	2	2	2
Dicumyl Peroxide	1	1	1
Raw ML4, 212°F.	55.5	36	54.5
Compd. ML4, 212°F.	76	64	74.5

Good physical properties — Tests made in the Goodrich-Gulf Sales Service Laboratory compare physical properties of Ameripol 4600 with 1502 (a standard, non-staining cold polymer) and with 1006 (a standard, non-staining hot polymer) in a typical crepe soling recipe. These tests indicate that you can make production cost savings with Ameripol 4600 while maintaining good quality products.

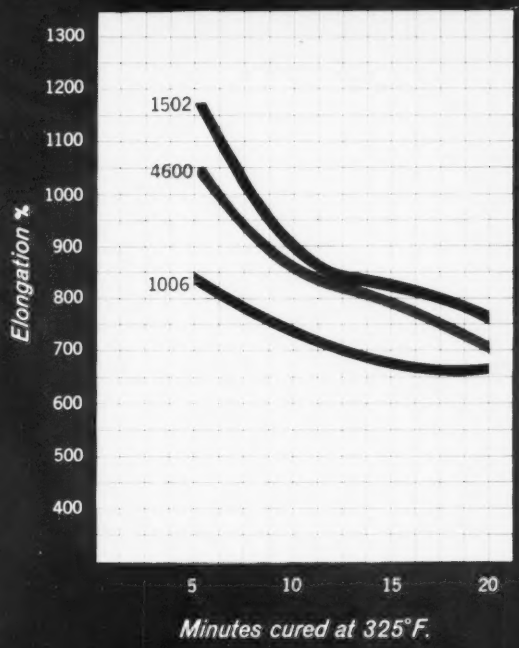
Ameripol
THE PREFERRED RUBBER

2600
2200
1800
1400
1000
600
400
300
200
100
Tensile Strength, psi.
100% Modulus, psi.

Good physical properties offered by **Ameripol 4600**

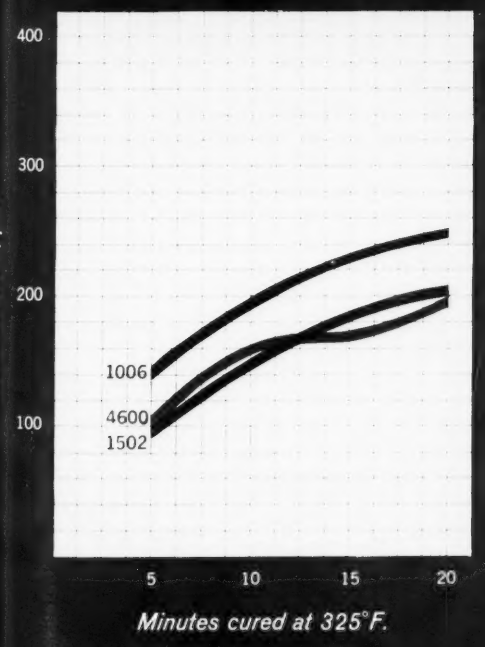


TENSILE STRENGTH

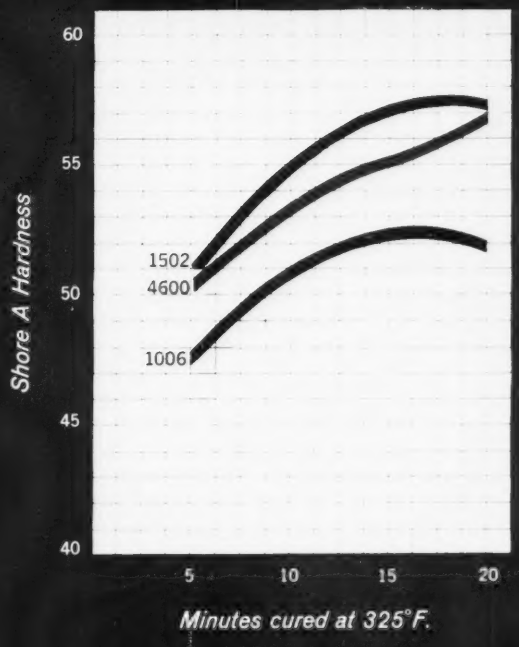


ELONGATION

MODULUS



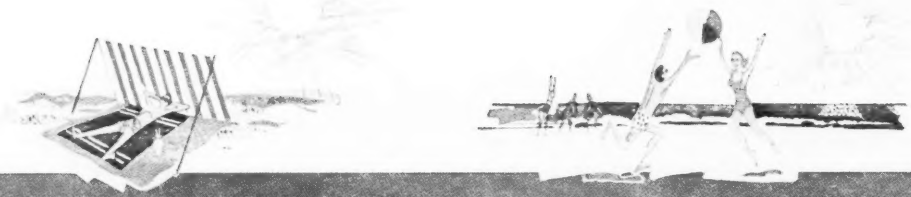
HARDNESS



Goodrich-Gulf Chemicals, Inc.

AMERIPOL 4600

is lighter, has superior color stability



UNEXPOSED SAMPLES

AFTER 20 HOURS LIGHT EXPOSURE

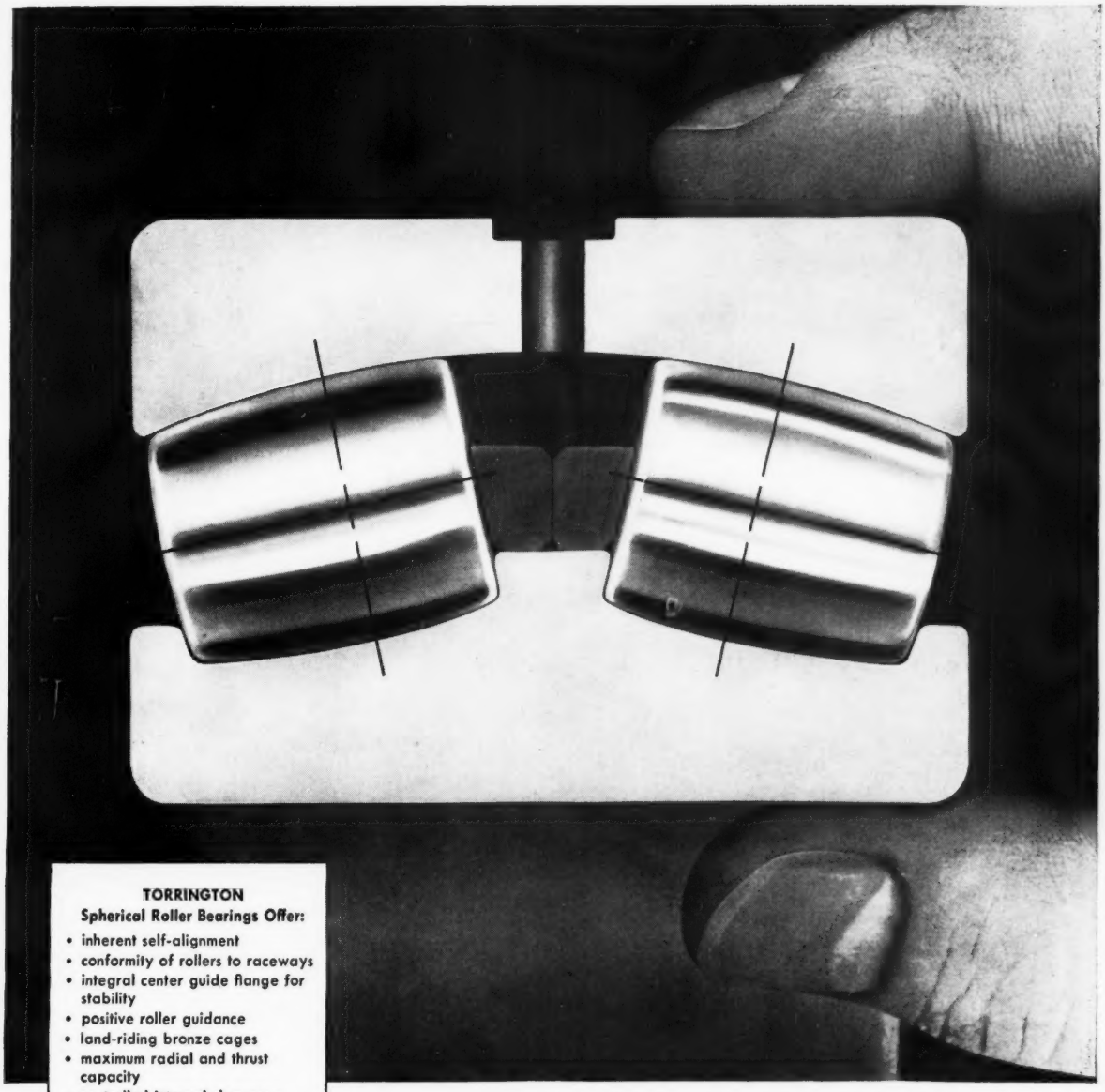
AMERIPOL 4600

SBR 1502

SBR 1006

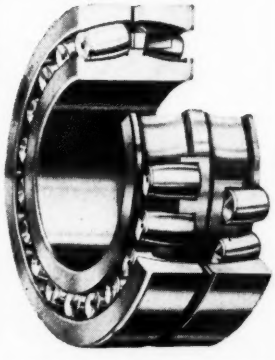
These samples are all compounded to the same recipe and the exposure tests were made with 20 hours of S-1 lamp. The superior color stability of Ameripol 4600 is another advantage worth investigating. Check your Goodrich-Gulf representative for information, or send for 4600 Technical Data Sheet. Write Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Goodrich-Gulf Chemicals, Inc.



TORRINGTON
Spherical Roller Bearings Offer:

- inherent self-alignment
- conformity of rollers to raceways
- integral center guide flange for stability
- positive roller guidance
- land-riding bronze cages
- maximum radial and thrust capacity
- controlled internal clearance
- electronically selected rollers
- even load distribution
- long, dependable service life



Shaped for Stability!

The asymmetrical shape of each roller in Torrington Spherical Roller Bearings contributes directly to operating stability and long service life.

The maximum roller diameter is not at the center of the roller. Located towards the center flange, it insures geometric positioning of the roller for positive guidance with free rolling action.

The roller shape also approaches that of a tapered roller. Lines extended from the roller-to-race contact zone converge at the roller and bearing axes. This approach to true conical rolling action further assures stability.

These are two more reasons why Torrington Spherical Roller Bearings operate cooler, quieter and with greater stability. For the ultimate in bearing performance and service life, always specify *Torrington* Spherical Roller Bearings. Send for new Torrington Spherical Roller Bearing Catalog #258.

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY South Bend 21, Indiana • Torrington, Conn.



The Scott Model LGP sets a new world standard of *safety* and *cleanliness* for pressure aging tests of rubber, silicone and other elastomers. Featuring 14 small-volume, seamless pressure cylinders encased in a solid, insulated aluminum block . . . the *safety-designed* Model LGP uses no liquid heating medium. No more oil-fire hazards and explosions! No more costly barricades needed to protect facilities or personnel. In addition, each pressure cylinder has a precise-seating, screw-on cap with pressure hose connection, separate purging valve, and a *blowout disc* for fast, safe release of excess pressure.

No Contamination Individual pressure stop cocks permit examination and removal of test specimen without disturbing conditions in the other pressure cylinders. Positively no migration or contamination from one pressure cylinder to another! All metal parts of the pressure system are of stainless steel (except blowout discs), eliminating metal contamination of material under test.

Easy Operation Slight hand pressure will open or close each pressure cylinder cap. Sensitive thermo-control switch and suitable insulation assure exact, stable regulation of temperatures. Also has over-riding thermo-switch for double protection. Scott automatic temperature recorders are also available to guarantee conformance with ASTM Methods of Test D-572 and D-454.

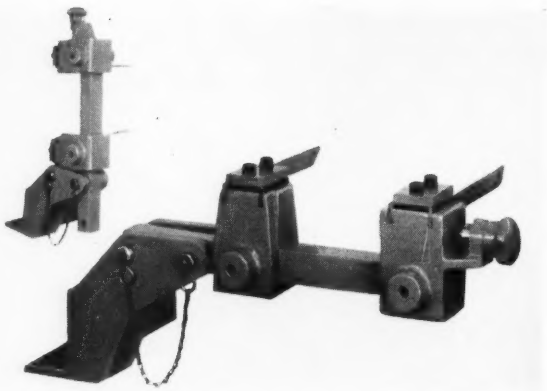
WRITE FOR COMPLETE FACTS ON SCOTT'S SAFETY-DESIGNED MODEL LGP

SCOTT TESTERS

THE SURE TEST . . . SCOTT!

Scott Testers, Inc.
90 Blackstone Street
Providence, Rhode Island

NEW EQUIPMENT



Mill strip cutter made by G. F. Goodman & Son

Goodman Mill Strip Cutter

The Goodman mill strip cutter, a swing-back attachment for cutting accurate strips which can be mounted on two-roll mixing mills for 24- to 84-inch sizes, has been announced by G. F. Goodman & Son, Philadelphia, Pa. The cutter is said to produce an accurate, clean-edged strip.

With micrometer knob, the strip cutter offers precise control over stock width from one inch to 12 inches with knob graduated in increments of 0.015-inch. Three-blade models and models without micrometer are available. Standard units can be changed for right or left frame mounting, of either front or back mill roll. Toolsteel blades, hardened to Rockwell C 35-40, can be resharpened with file or bench grinder and are mounted securely in place, eliminating the possibility of damage to mill rolls.

For maximum safety, the unit swings either up or down and locks in place out of the operator's way when not in use.

An illustrated bulletin giving further information is available from the company.

Model 223 Electric Batch Weighing System

Gilmore Industries, Inc., Cleveland, O., has announced its new Model 223 electric batch weighing system which can be used for batching operations in the manufacture of bulk chemicals, cement, rubber, asphalt and other products.

The M223 uses a bonded strain gage load cell as the load sensing element. Bearings, levers, and springs are eliminated. The M223 offers high accuracy (system accuracies are available from 1/10% to 2%). Design application is flexible, and remote control indicating, recording, or printing instruments are possible with the system, according to the manufacturer. The M223 has no moving parts, requires little maintenance. Load cells are sealed; so they are suited for operation in corrosive and hazardous atmospheres.

The M223 is available for manual or automatic batching. The manual model controls weight input of one material, and the system is manually reset for addition of each additional component. With the automatic model, the weight of each component is preset; and the system automatically controls the sequential addition of multi-number components.

Ask your Velsicol representative how to make **rubber tough, stable & more profitable**

Velsicol's X-30 and GD-5-28 Hydrocarbon Resins are both ideal softeners and tackifiers for synthetic rubber. X-30 HYDROCARBON RESINS used in white or light colored rubber products maintains resistance to ultra violet discoloration, keeps products light, fresh and appealing on display and in use.

GD-5-28 HYDROCARBON RESINS are perfect for the darker formulations for shoe soles and heels, hoses, fittings, wire insulations and many other uses.

Higher loadings of these Velsicol Resins mill readily and help produce smooth milling stocks that have good calendering and tubing properties. Velsicol's economically priced resins lower the product price substantially while keeping quality constant. X-30 and GD-5-28 are readily available in continuous supply and with uniform quality.

Ask your Velsicol Representative or write now for complete Velsicol technical data and testing samples that will show you how to put more profit in your quality rubber products.

Velsicol

VELSICOL CHEMICAL CORPORATION,
330 East Grand Avenue,
Chicago 11, Illinois



WORK WITH THIS MAN ...your Velsicol representative a qualified chemist who can help you make better products for less!

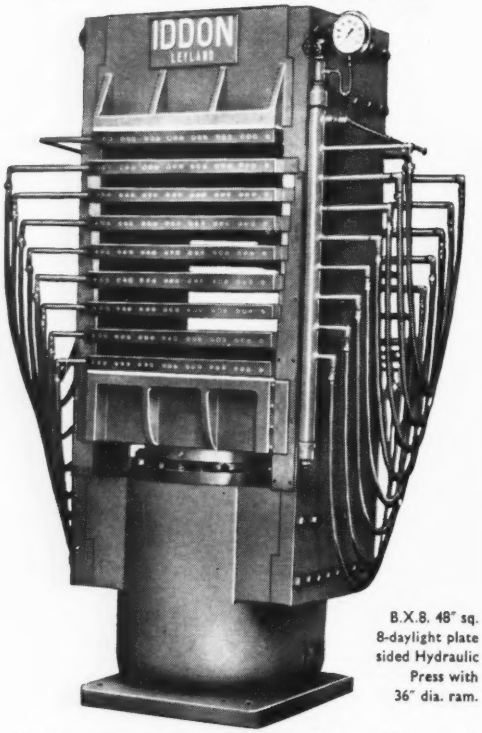
MAIL COUPON TODAY FOR LITERATURE AND TEST SAMPLES

VELSICOL CHEMICAL CORPORATION RW-40
330 East Grand Avenue, Chicago 11, Ill.
International Representative: Velsicol International Corporation, C.A.
P.O. Box 1687 • Nassau, Bahamas, B.W.I.

☐ Please send test samples of X-30 and GD-5-28.
☐ Please have a salesman call. ☐ Please send technical data.

Name_____
Company_____
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SOLUTION to a PRESSING PROBLEM



8.X.8. 48" sq. 8-daylight plate sided Hydraulic Press with 36" dia. ram.

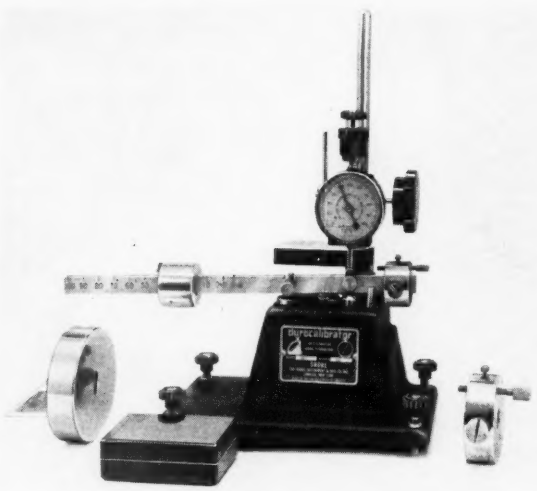
The Machine illustrated has been designed to meet the exacting requirements of a leading Manufacturer —who specialises in advanced methods of production. Repeat order proves its satisfaction.
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New Equipment



Durocalibrator for calibrating Shore durometers

New Shore Durocalibrator

A highly accurate and ruggedly constructed beam scale device, called the Durocalibrator, which enables durometer users to verify accuracy and to calibrate their instruments, has been developed by The Shore Instrument & Mfg. Co., Inc., Jamaica, N. Y. The Durocalibrator may be used for any quadrant-style Shore A durometer or round-style Shore A-2 durometer conforming to the current ASTM Designation D 676-59T.

The instrument may also be used for calibrating other durometers provided they conform to certain indentor protrusion and spring load specifications. In the realm of durometers with mainsprings having a maximum deflection of 10 pounds, the Durocalibrator may be used for calibrating the Type D (ASTM D 1484-59), the Types C and DO. A special sliding weight and a counterweight are supplied to calibrate durometers with 10-pound mainsprings.

The Durocalibrator consists of a cast-iron base weighing about 10 pounds and measuring 10 by 6 by 5 inches high. On the base are mounted an indexed balancing beam for calibrating the durometer mainspring, and a vertical column on which the durometer is poised over the balancing beam. This instrument enables its users to keep periodic checks on their durometers over the entire scale and allows for recalibration with a maximum of ease.

Bulletin R-6, which gives method of assembly after unpacking, use and care of the instrument, and ordering instructions, is available from the company.

New Bristol Velotron Pyrometer System

The Bristol Co., Waterbury, Conn. reports that sensitivity at low temperatures, direct-reading charts and scales, interchangeable head units, and automatic ambient temperature compensation are some of the features of its new Bristol Velotron low-range pyrometer system.

In operation, the pyrometer unit is sighted on the surface to be measured, by use of an eye-piece on the unit. The thermocouple output from the pyrometer unit is input to a Bristol Dynamaster instrument. The instrument automatically corrects for ambient temperature and records the corrected measurement. A simple knob adjustment on the instrument corrects for emissivity of surface being measured.

This new system will measure temperatures in ranges from 0 to 1,100° F. It is especially applicable for temperature measurement, recording and control, with such products as rubber, synthetic rubber, paper, plastics, carpeting, conveyed, rolled, or extruded products, and reactor kettles, furnace and oven charges.

4 good reasons for buying ASRC quality polymers

1 UNIFORMITY

When you buy ASRC polymers, you get full assurance of the same high quality from shipment to shipment.

2 EASE OF PROCESSING

You get easier, smoother, more rapid processing with all ASRC polymers. You benefit from lower power costs, superior physical properties.

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Situated at the "hub" of the rubber market, ASRC is within overnight trucking distance of most key points.

4 FAST SERVICE

Shipments are expedited at ASRC through prompt, personal attention to your orders. Faster delivery can be assured by placing your orders by telephone, telegram or teletype.

It Pays to Rely on ASRC

Current Polymers

COLD	CLASS
ASRC 1500	Staining
ASRC 1502	Non-Staining
ASRC 1503	Non-Staining
ASRC 1507	Non-Staining
ASRC 3105	Non-Staining
ASRC 3106	Non-Staining
ASRC 3110	Non-Staining
COLD OIL	
ASRC 1703	Non-Staining
ASRC 1708	Non-Staining
ASRC 1712	Staining
ASRC 1713	Non-Staining
HOT	
ASRC 1004	Staining
ASRC 1006	Non-Staining
ASRC 1009	Non-Staining
ASRC 1018	Non-Staining
ASRC 1019	Non-Staining
ASRC 3014	Non-Staining

Data sheets and test samples upon request.

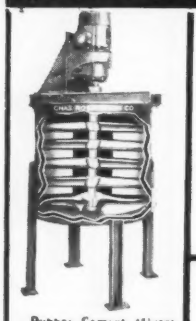
ASRC

AMERICAN SYNTHETIC RUBBER CORPORATION

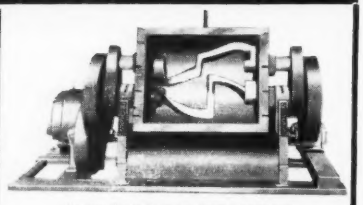
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gives better results in less time!

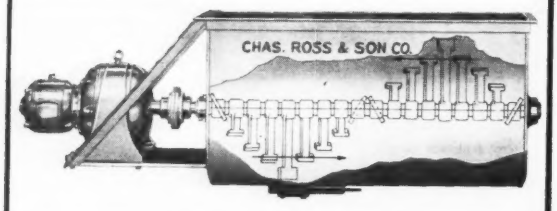


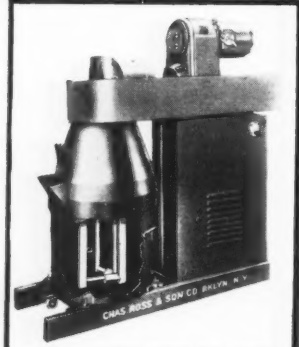
Rubber Cement Mixers
100 - 1000 Gal. sizes



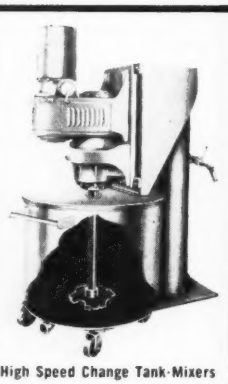
Heavy Duty Double Arm Kneaders
1 pint - 150 Gal. sizes

Rubber Reclaiming Mixers
100 - 1000 Gal. sizes





Double Planetary Change Can Mixers
1 - 150 Gal. sizes



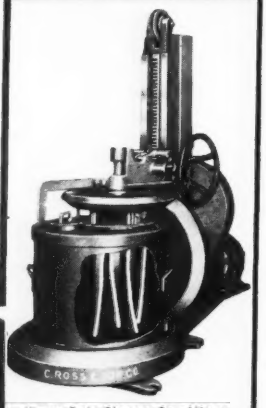
High Speed Change Tank-Mixers
80 - 250 Gal. sizes



Heavy Duty Paste Mixers
25-1000 Gal. sizes

Also Dry Crushing and Pulverizing Mills, Three Roller Mills, Hopper Mills, High Speed Dissolvers or Dispersers, and Mixers of all types for Dry, Liquid, Paste and Heavy Paste Materials.

Write for complete information!



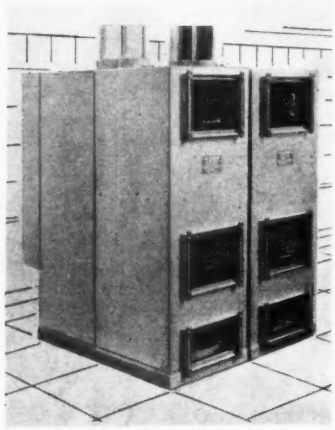
Heavy Duty Change Can Mixers
8 - 60 Gal. sizes

CHARLES ROSS & SON COMPANY, INC.

148-156 (W) Classon Avenue, Brooklyn 5, N.Y.

New Equipment

The Yerzley Scrubber



Yerzley scrubber, an air pollution control device

The Yerzley scrubber, a new air-pollution control device has been introduced by John Wood Co., Air Pollution Control Division, Bernardsville, N. J. The scrubber embodies a new concept of operation based on the principle of interphase reaction. Extraordinary high intimate contact between the air or gas and the absorbent is achieved in a compactly designed unit through wet-bed packing only a few inches deep and maintained in a flooded condition.

Each unit is composed of two packed and flooded reaction beds which subdivide the total chamber into three plenums. Liquid is supplied at the top of the scrubber and flows downward successively through the flooded reaction beds, while the gas or air to be processed enters the bottom of the scrubber and flows upward through the two beds.

The scrubber has been proved during years of field testing under the direction of its inventor, Felix L. Yerzley, who is also the inventor of the Yerzley oscillograph for testing the resilience of rubber. In application the Yerzley scrubber has been successful in the removal of fumes of hydrochloric, sulfuric, nitric, and hydrofluoric acids; nitrogen oxides; alcohol; acetone; ammonium chloride; hot vegetable oils; sulfur compounds; hot grease vapors; and fine dusts.

The scrubber is available in capacities from 25 to 5000 cubic feet per minute. The units are of corrosion-proof construction and include fan and motor.

A brochure with a description and specifications of the Yerzley scrubber is available from the company.

New "High Boy" Shop Crane

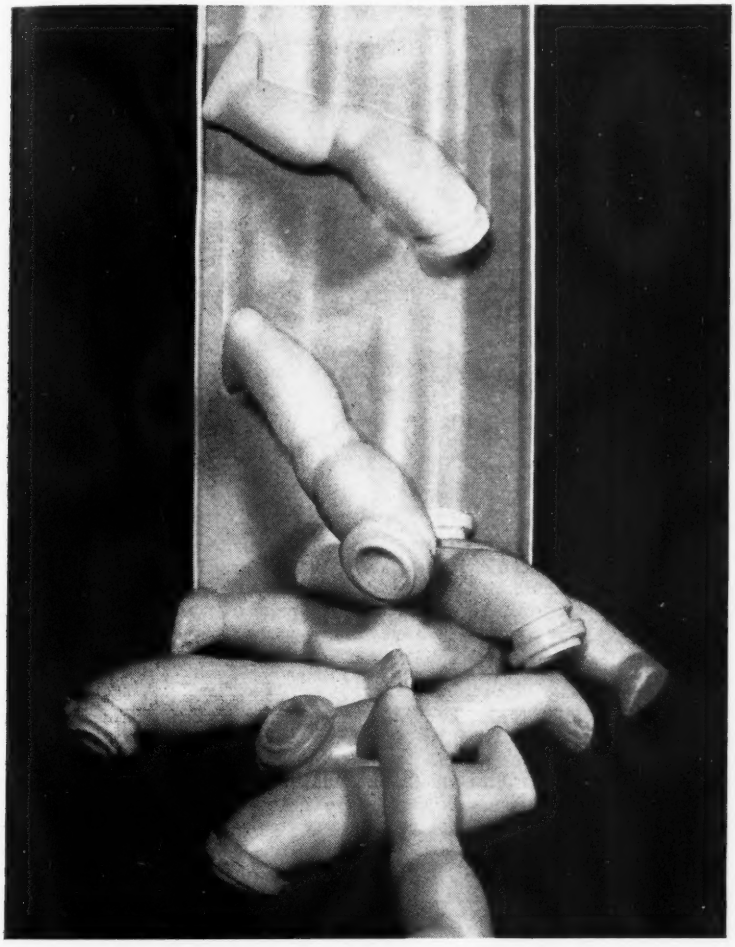
A new multi-position high lift portable crane has been developed by Thern Machine Co., Winona, Minn., for lifting and moving heavy or awkward loads for marine and general shop use. With mast and boom fully extended, the crane will lift weights up to 750 pounds to a height of 14 feet. Mast and brace telescope as one unit and are easily raised up or down by a hand-winch mounted on the mast. The boom brace automatically moves with the mast.

The crane is easily moved through standard doorways when the boom is retracted to fully horizontal position. Maximum lift capacity is 1250 pounds, with boom fully retracted to 34 inches, and mast and brace fully retracted to lifting height of 8 feet 8 inches. All loads are smoothly and easily handled with the Model 40W hand-winch mounted on the brace. Positive spring-loaded ratchet lock assures safe operation and holds load at any position.

Heavy rectangular steel tubing construction provides strength, rigidity, and resistance to twisting when the crane is used at the extended ranges of its height and reach. Where desired, an optional outrigger unit is attached simply by sliding through an opening provided in the base. A sheave block and 45 feet of 3/16-inch wire rope are standard equipment.

Rated best for heavy loads on hard floors is the Model WC557-AF equipped with six-inch hard fiber wheels in front and four-inch hard fiber casters in rear. Rated best for lighter loads, rough floors, and use outdoors is the Model WC557-AR, equipped with 10-inch full pneumatic wheels in front, six-inch semi-pneumatic casters in back.

Pop Out Perfect Products

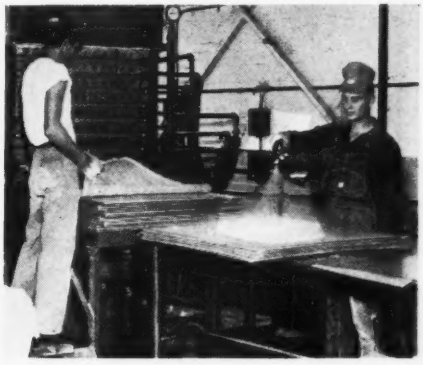


Dow Corning Silicone Mold Lubricants Assure Finer Details, Fewer Rejects

Toys and dolls, mats and heels, tires and tile — all kinds of rubber products — pop out cleanly, time after time after time, from molds lubricated with Dow Corning Silicones. These silicone release agents give uniform stick-free release . . . assure sharp surface detail, reduce rejects to a bare minimum, increase profits.

Dow Corning mold lubricants help you realize noteworthy savings, too . . . practically eliminate the need for cleaning molds. In turn, mold downtime is reduced . . . service life increased. New production efficiency, better looking products, lower maintenance costs, less waste . . . advantages like these have led more and more molders of rubber products to standardize on Dow Corning silicone release agents.

Easy and economical to use, Dow Corning mold lubricants are available in a variety of forms . . . for all types of rubber . . . for all types of molds.



Water-dilutable emulsions, solvent soluble fluids, greaselike compounds, different forms for different uses. Whatever you make . . . if it's molded of rubber — you can count on Dow Corning development engineers to formulate a silicone mold lubricant that'll release it efficiently and economically!

More Cost-Saving Silicones . . . In other areas of the rubber industry, too, Dow Corning Silicones have proved to be time and money savers: as electrical insulation



for mill and mixer motors; as anti-adhesive coatings for bags, containers and interleaving; as heat-resistant paints that also resist weathering and corrosive atmospheres; as lubricants for ball bearings; and as Silastic® gums and bases for compounding silicone rubber stocks to meet severe performance requirements. For more information about silicone release agents or other silicones for the rubber industry, write Dow Corning, Dept. 9404.

Your nearest Dow Corning office is the number one source for information and technical service on silicones.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

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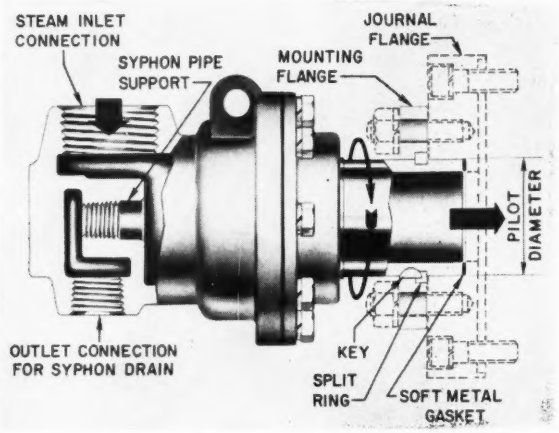
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New Equipment



Sectional view of new Barco Type CF rotary joint

New Barco Flanged Rotary Joints

Improved convenience in installation and accurate control of concentricity are features of the new Type CF rotary joints developed by Barco Mfg. Co., Barrington, Ill. The design eliminates need of threaded connection of the rotary sleeve, which is sometimes difficult to disconnect from rotating drum journals after long service.

The new Type CF joint is equipped with a machined straight rotating sleeve, in which the outside pilot diameter is held to close tolerances. Attachment of the joint of the rotating drum, dryer, or roll is by means of a mounting flange keyed to the rotating sleeve. Only an end wrench is required to install or remove the joint, which is attached by four nuts.

In applying the Type CF joint, the rotating joint may be machined to receive the pilot end of the joint sleeve; an alternative, preferred method is to apply a separate journal flange machined to fit the pilot diameter of the joint. Barco is prepared to furnish, on order, various styles of journal flanges.

Internally, the Type CF joint is the same as Barco Type C rotary joints with threaded sleeve connections. This design features self-lubricating bearings and seal. The seal is self-adjusting for wear, eliminating the need of periodic adjustment.

The new Type CF flanged joints are now available in 2-, 2½-, and 3-inch sizes suitable for up to 200 psi. saturated steam or 400 psi. cold working pressure. Also, hot oil, under 100 psi., can be handled up to 500° F. All sizes are built for use for either single flow or syphon flow service.

The joints are expected to have broad application in paper, rubber, chemical, food products, and general industrial use, as well as by product design engineers for various machinery.

Detailed information on Type CF rotary joints is given in Catalog Sheet 331, which is available from the company.

New Trost Jet Mills

Engineered Materials, New York, N. Y., has been appointed the exclusive sales agent for the Trost Jet mills, fluid energy mills manufactured by Trost Jet Mill Co., Moorestown, N. J. The basic principle of a jet or fluid energy mill is that the particles to be ground collide against themselves with high impact velocities of up to 1,000 feet per second or higher.

The usual jet mills often contaminate the material being ground because of the abrasion of the walls of the grinding and collecting chambers. The Trost Jet mills are said to eliminate such contamination by the use of proper linings. The parts subject to the most abrasive action can be made of alloy steels, silicon, tungsten, boron carbide, ceramics, rubber, or other materials.

As in all grinding, the final particle size is dependent upon

(*Continued on page 62*)

TIRE FABRIC PROCESSING EQUIPMENT

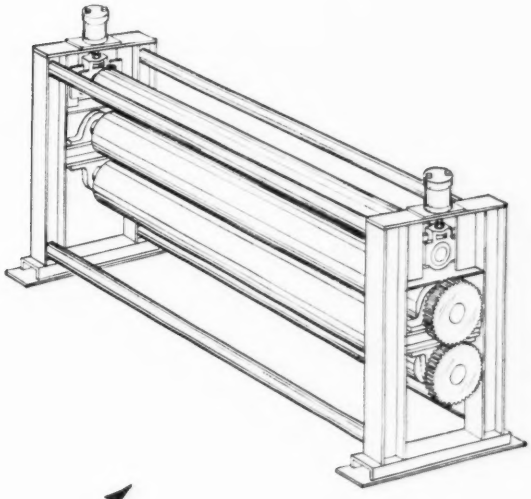
TENSION STANDS

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VERTICAL OR HORIZONTAL ASSEMBLIES
WITH OR WITHOUT NIP ROLL

RUGGED FRAME SUPPORTS TWO
OR MORE ROLLS

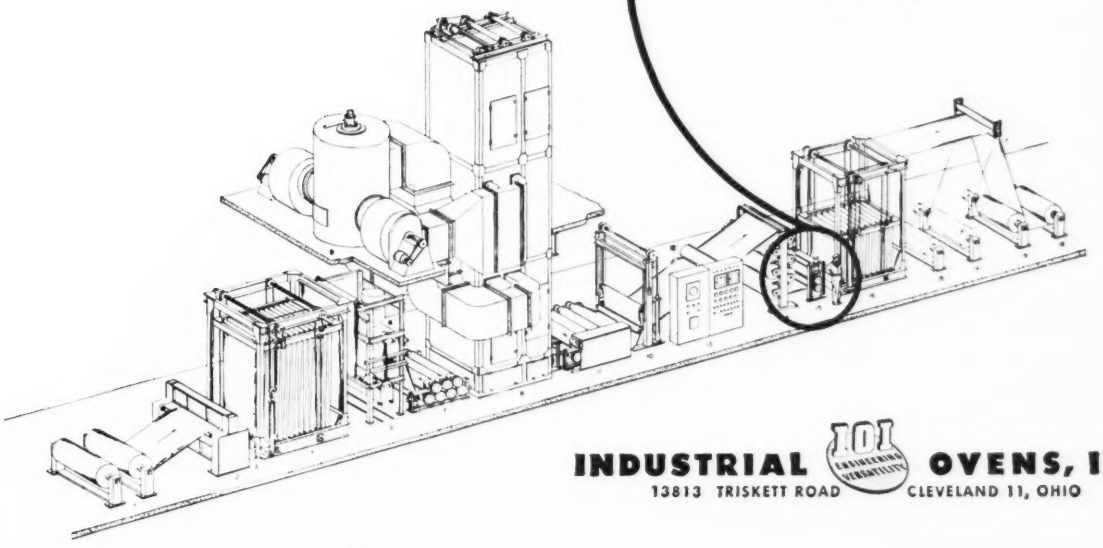
STEEL, CHROMIUM PLATED, MEEHANITE,
RUBBER COVERED OR TEFLON COVERED
ROLLS CAN BE SUPPLIED

DESIGNED FOR ANY TENSION
DEFLECTION NOT TO EXCEED .010"

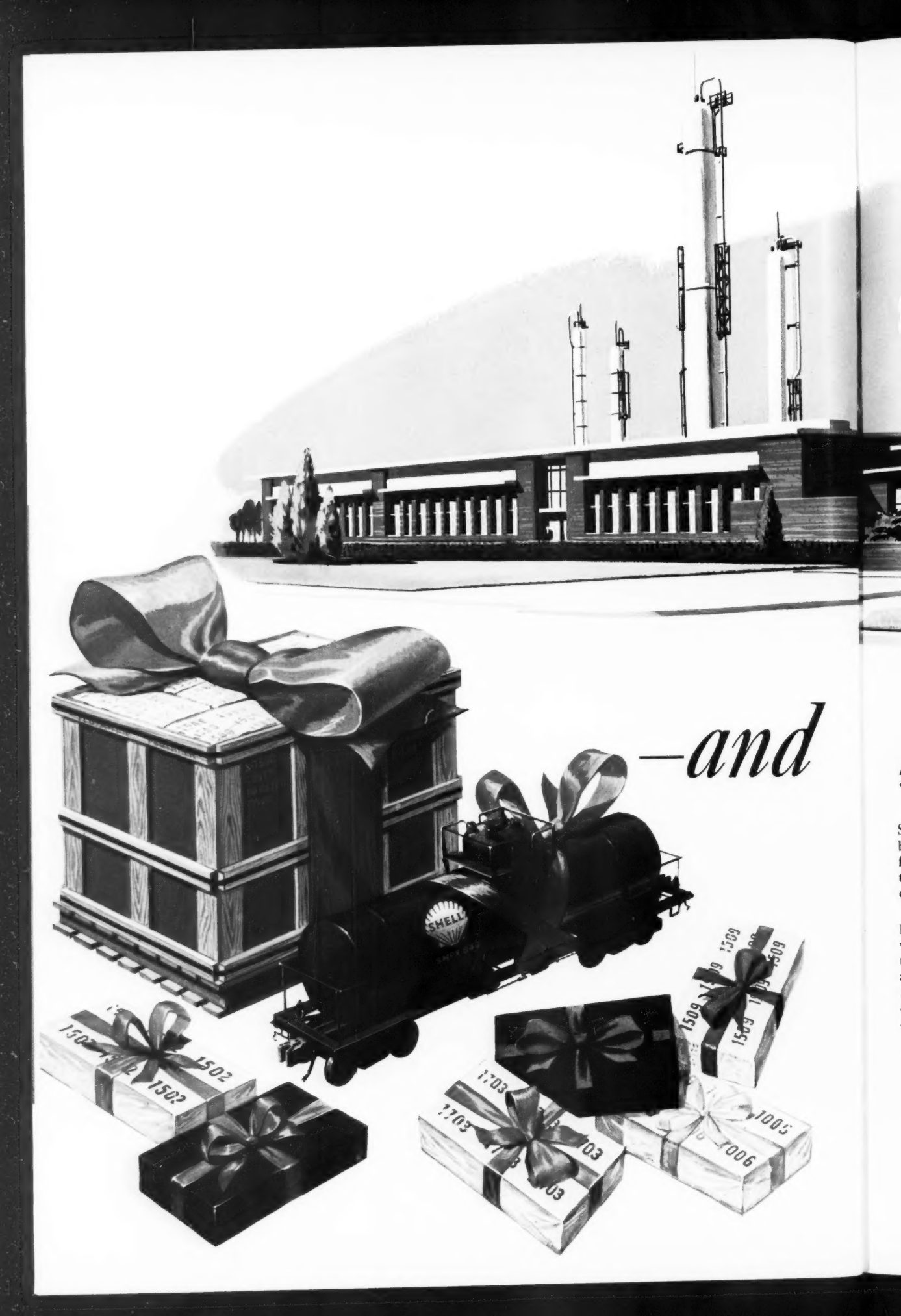


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—and
SHELL



more to grow on

Soon, there will be an important birthday in the rubber industry. Just five years ago, private ownership of the nation's SBR manufacturing facilities came into being.

A lot has happened in these years. Important new polymers have been developed. There are now more and better types of SBR to choose from. And in addition, private enterprise has provided its customers with improved distribution, advanced packaging, and readily available technical services.

An outstanding example is the plant at Torrance, California—the only fully integrated operation for the manufacture of styrene, butadiene and rubber—today the home of Shell Chemical Company's Synthetic Rubber Division.

In the past five years, the number of Shell S-Polymers has been doubled. Improved hot, cold, and oil-extended polymers; new black and resin-rubber masterbatches; hot and cold latices have been added since the first list of S-Polymers appeared. In addition, Torrance is now producing the world's first commercial synthetic polyisoprene—Shell Isoprene Rubber—closely similar to natural rubber.

Packaging such as the Flotainer®, which controls cold flow and saves storage space, has been developed at Torrance. Buying Shell rubber has been made easier with the addition of sales offices in Cleveland and New York—as well as six warehouses conveniently located throughout the United States.

Technical service is another advantage offered to Shell customers. Many producers of finished rubber goods work closely with Shell in developing special techniques and formulations.

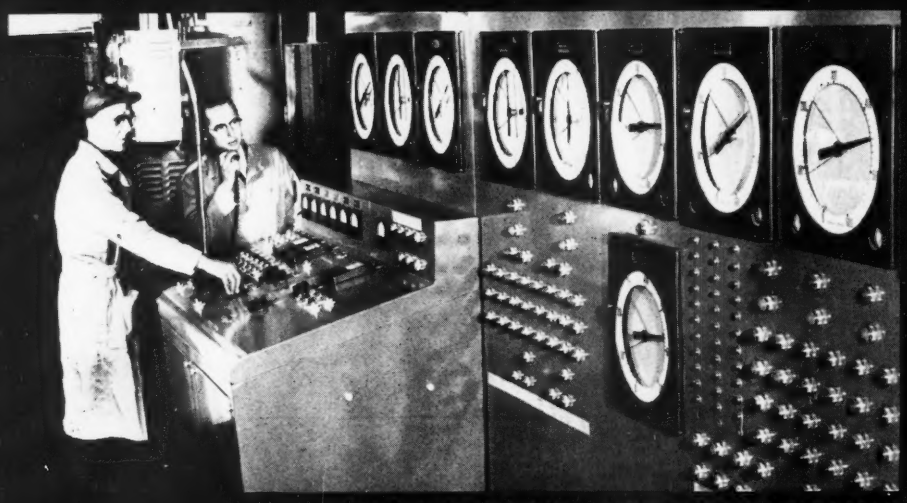
Your Shell representative can tell you more about the complete Shell line of general purpose rubber, new polymers, and technical service. *Just write or telephone the Shell Chemical office nearest you.*

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SYNTHETIC RUBBER DIVISION
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SHELL

START UP. . . moment of truth



Control Center — Calendar Treating Line Photo courtesy Armstrong Rubber Manufacturing Co.

Whether the simplest kind of equipment installation — or the world's first triple-zone rayon/nylon calendar line as shown here — the moment of startup is the culmination of months of calculation and construction . . . an inexorable test of soundness of engineering, skill of manufacture and field erection.

This unique new process line — highly advanced in operation and control — performed at startup, and after a brief two-week testing and minor adjustment period exploring the multiple operating possibilities, went into full-time production at 60 ypm.

Achieving anticipated operating results from the moment of startup is the rule with Litzler fabric treating lines and units. "Our plant engineer reports that the unit has operated very satisfactorily since the time of its installation"* . . . and "Having completed the installation of the subject machine, we want to express our satisfaction at the way it is working and at first results"* . . . are typical judgements of owners.

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IMPROVE CURE,
RETARD SCORCH
in Neoprene
Compounding
with

GENMAG MLW
Acid Accepting Magnesium Oxide





GENMAG MLW is available in convenient 50 pound heavy-duty, lined vapor barrier bags in addition to the familiar 5 pound polyethylene bags packaged 12 to a carton.

GENMAG MLW
is a reactive Magnesium Oxide that provides an excellent cure in even the most difficult Neoprene applications and gives a consistently high degree of scorch protection. GENMAG MLW is also widely used in rubber-based adhesives to increase tack and stabilize viscosity.

COLOR	Pure White
AVERAGE PARTICLE SIZE	3 Microns
BULK DENSITY	18-22 pounds
MOISTURE	Nil
COPPER	.0003% max.
CHLORIDES	Nil
MANGANESE	.004% max.
ACTIVITY	Moderate

GENMAG MLW is manufactured by: General Magnesite & Magnesia Company

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Further details are easily obtained by writing to:

SECRETARY
INSTITUTION OF THE RUBBER INDUSTRY
4, KENSINGTON PALACE GARDENS
LONDON, W. 8, ENGLAND

Telephone: Bayswater 9101

New Equipment

(*Continued from page 56*)

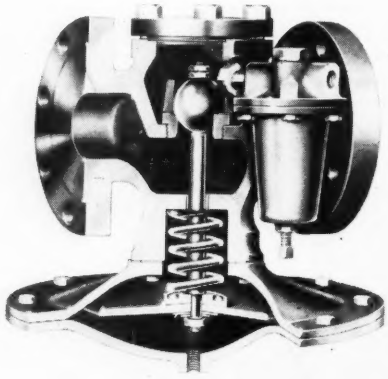
many factors such as power input, hardness of material to be ground, rate of feed, etc. Opposed jet impact in the Trost mill makes double energy available. This mill is reported to have successfully ground materials such as titanium boride (TiB_2) to 80% below one micron.

These mills are available from laboratory mills to large production sizes producing tons per hour. The results obtained on the laboratory mills can be duplicated in the production mills as the basic design and proportions are said to be identical.

An effective classifier is part of the system that may be operated for different maximum size particles from fine sieve meshes to one micron. The operations can, if desired, be controlled to minimize fines.

Controlled atmospheres are easily used in the mills, and the entire system can be constructed so that the ground material is taken off in the selected atmosphere and sealed from air contamination. Materials requiring cooling during grinding are also easily handled.

Three descriptive bulletins giving more detailed information on the jet mills are available from Engineered Materials.



Klipfel No. KP-4 Valve

No. KP-4 Pressure Reducing Valve

A new, external pilot-operated steam pressure-reducing valve has been announced by Klipfel Valves, Inc., Hamilton, O. Designated No. KP-4, the valve is said to meet all requirements for use at most steam pressure reducing valve installations.

Although this valve is extremely sensitive, its simple operation insures trouble-free service. Pressure adjustments are quickly and easily made by turning the adjusting screw on the pilot valve. It will close tightly for dead-end service.

Features of the valve include an AISI-type 440C stainless-steel ball inner valve, spherical and extremely hard, which closes against a monel seat ring. This combination is said to withstand indefinitely the wire-drawing effects of steam. The tapered form of the opening between the ball inner valve and the beveled seat ring increases the valve capacity by streamlining the flow of steam.

The large main valve diaphragm is made of stainless steel to permit use with higher pressures and temperatures. The control spring is located entirely outside of the path of steam flow.

This valve is manufactured in sizes from ¾-inch to four inches. It may be had with bronze, semi-steel, or cast-steel body. Screwed ends are offered in sizes from 1¼ to four inches. Stainless-steel trim, in both the main valve and pilot valve, is standard in all sizes.

Complete information and a bulletin, designated Bulletin No. 600, which gives a detailed description of the valve, are available from Klipfel.



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SEIBERLING
MAKE
BETTER TIRES



Photograph courtesy of Seiberling Rubber Company



Combination and single purpose instruments.

Subjecting tires to accelerated road tests is regular procedure in quality control at Seiberling Rubber Company. Engineers must know sub-surface temperatures of tires during tests. Illustration shows a Seiberling engineer supervising the use of a Cambridge Needle Pyrometer. In addition to research, Cambridge Pyrometers are widely used in many industries for temperature determination in routine production. They are accurate, quick acting, rugged and convenient to use. Made in three models.

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Bulletin 194-S gives details of these instruments.
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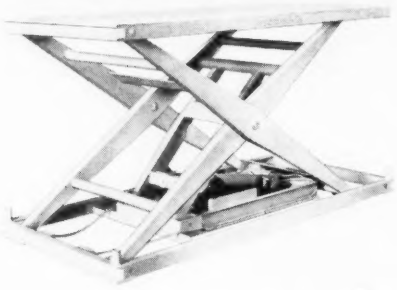
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TRADE MARK

New Equipment



New LP-3 lift table

Southworth LP Lift Tables

For manufacturers with handling problems involving long bulky or large light loads, in such industries as furniture, plastics, rubber, metal-working, graphic arts, Southworth Machine Co., Portland, Me., has added a new LP series of scissor-type, hydraulic-powered lift tables, to simplify lifting, feeding, and work-positioning of long loads for machine, process, or assembly operations.

LP series models range in capacity from 1,000 to 6,000 pounds; platforms from 38 inches minimum width to 65 inches maximum width; from 7 feet minimum length to 16 feet maximum length. Collapsed heights range from 9½ inches minimum to a 12-inch maximum. Vertical platform travel is available up to 40 inches, but can be extended to 60 inches.

In common with all models in the company's four-basic lift-table series, the new LP tables have no superstructure and are completely self-contained, thus minimizing accident hazards. This new series virtually eliminates fatigue and will profitably increase the use of heavy-investment production equipment, it is claimed.

New Langley Lifter/Transport Truck

Langley Mfg. Co., Inc., Cambridge, Mass., is now offering its new mobile compact hydraulic lifter and transport truck, designed for use by one man. Featuring foot operation, the Model FPD Little Dickie needs minimum foot effort for lifting loads up to 750 pounds. Lifting to a height of 64 inches above floor level, the unit frees high-rate power equipment for bulk handling operations.

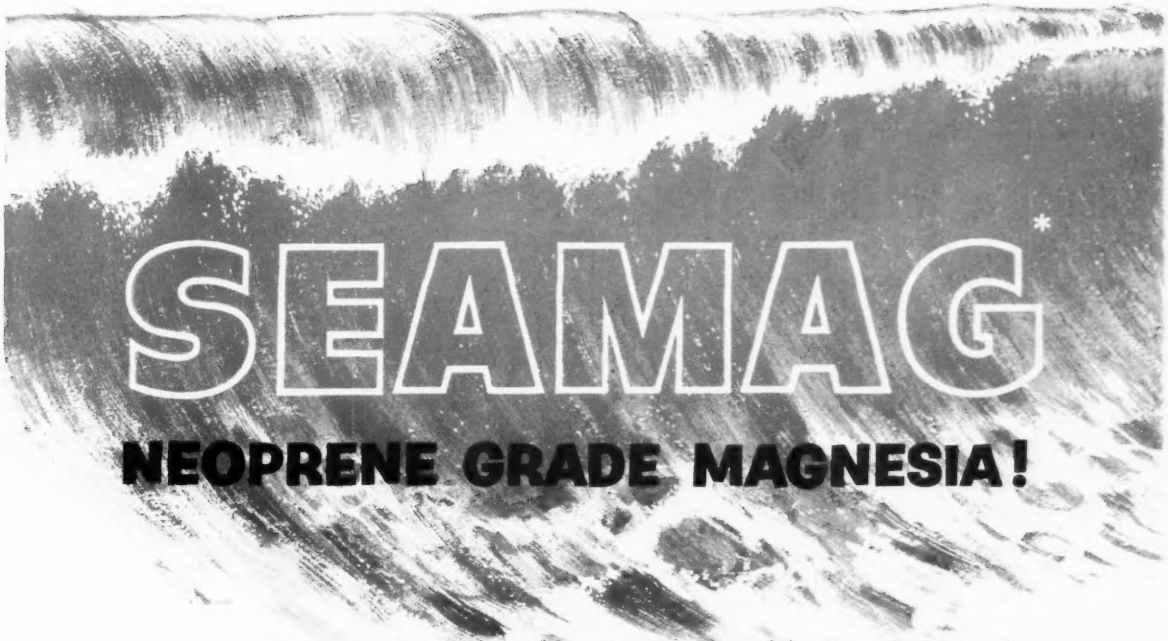
The fluid pressure of the hydraulic system holds the load, affording safe operation. No lifting handle or open gears that constitute a danger during operation are incorporated into the unit. Optional equipment includes a floor lock for applications where conditions require it, floor protective wheels and pipe runners to assist loading on to trucks.

Whether load is raised or lowered, this model features tight maneuverability, easily controlled by one man. It finds application as a warehouse utility lift and transport truck, in tiering, stacking, breaking down piles, and loading. This model also lowers or lifts from or to dock and street level and makes an excellent stock positioner in cutting, milling, sawing, and similar operations. It also serves as a transporter for such items as dies, jigs, molds, castings, index heads, and other tools.

Mast and base are steel tubing, with mast and frame arc-welded into a single unit, giving it light weight with a high safety factor. Lifting speed is one inch per stroke under full load conditions. Weighing only 204 pounds, Model FPD is painted a bright safety yellow for maximum visibility under all lighting conditions. It easily can be lifted on to a truck for transport to and from application areas.

Also available is a battery powered model, designated Model BHD, which features a power unit that lifts at the rate of 20 feet a minute, and a built-in a.c. overnight charger and storage battery.

Now! another cost-cutting *fmc* development



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NEOPRENE GRADE MAGNESIA!

Newest addition to FMC's widely diversified line of magnesias . . . gives neoprene and synthetic rubber compounders these advantages:

High bulk density!
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To provide better dispersion and distribution throughout the batch.

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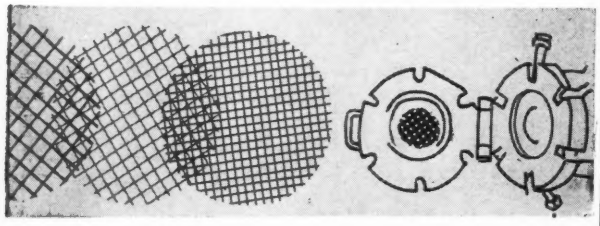
- from all metals • to any diameter
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- NEW, improved LACQUERS for Rubber Footwear, or any rubber product where lacquer is used as a pre-cure coating.
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- CASUALS, footwear. NCP 1909 is an excellent dulling and anti-tack agent on edges of soles or crepe wrappers used in the manufacturing of casual type footwear.
- SPECIAL lacquers for all types of rubber products.

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NEW PRODUCTS

Seiberling's Carbo-Kwik Tread Stock

Seiberling Rubber Co., Akron, O., has added a new, premium fast cure, cold rubber retreading stock to its line of repair materials. The new tread stock, called Carbo-Kwik, was announced at a recent general sales conference by R. G. Knecht, manager of accessories and repair materials sales at Seiberling Rubber Co.

Carbo-Kwik represents the company's recognition of the challenge being created by the rapid growth of the retrading industry. Retreading volume has increased almost 300% in the last ten years, and in 1960 it will be up 6-8% over 1959 volume.

Carbo-Kwik, Knecht claimed, will reduce curing time by about 30%, a significant fact to the retreader who wants to increase production capacity without increasing production facilities.

New Ray-Man "CX" V-Belt

Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J., has developed a fully molded fully jacketed notched V-belt said to be the only construction of its kind. Advantages claimed for this new belt, called the "CX" V-belt, are quiet, vibrationless running characteristics, ruggedness, and greater flexibility, permitting it to run smoothly over smaller pulleys. The fully molded and fully jacketed construction is said to eliminate flex-cracking and to increase fatigue resistance. The firm, fabric covered body also resists cross-sectional distortion, maintains lateral stability, and resists changes in effective length. This patented, notched belt is said to be cool running, outlasting other belts as much as eight to one in actual performance tests.

In the molded "CX" V-belt, the high-tensile-strength cord members are micro-positioned and formed into an arch through a patented molding process. This cord placement results in increased sidewall pressure, providing more grip, little or no slippage, and more uniform pitch.

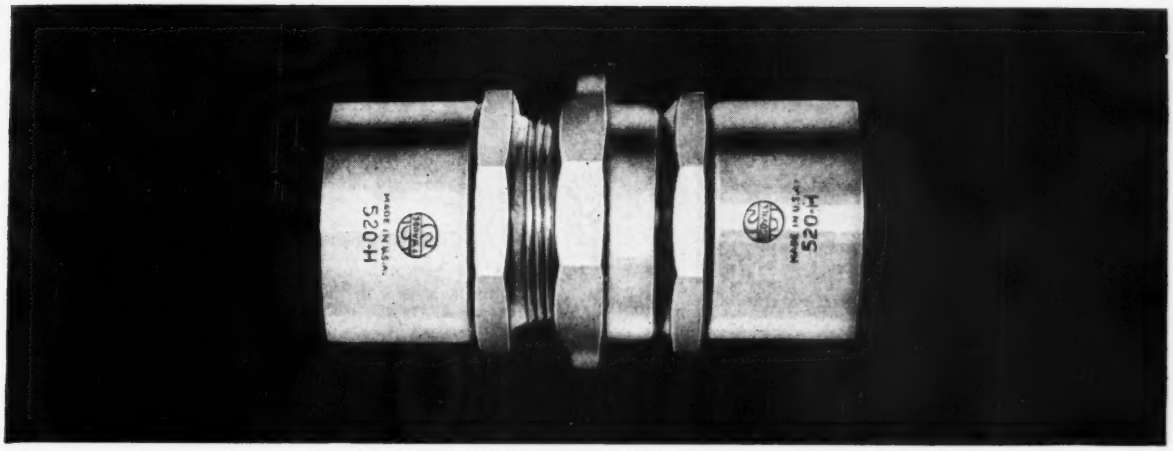
At present, this new belt is available only to original-equipment manufacturers.

APCO Liquid Rubber Paint

A new liquid neoprene paint, designated APCO Liquid Rubber Paint, is now available from Adhesive Products Corp., New York, N. Y. APCO can be applied easily by brush or spray to metal, wood, plastic, concrete, and other surfaces and dries in minutes to form a strong permanent protective coating, it is claimed.

The new paint is a permanently flexible, self-vulcanizing paint and will not peel, blister, or crack under changing climatic conditions, reports the manufacturer. It is said to be impervious to water, oils, gasoline, naptha, acids, alkalies, and most solvents and protects against rust, mildew, and fungus. APCO is recommended for a variety of protecting, cementing, mending and repairing, and rust-proofing applications both indoors and outside.

APCO comes in pint, quart, one-gallon, and five-gallon cans and in 55-gallon drums. A technical data sheet is available from the manufacturer.



SCOVILL'S NEW 1 3/8" FUEL OIL COUPLING MEETS ALL 3 VITAL REQUIREMENTS!

Before you re-order fuel oil couplings, it will pay to match their performance against these 3 vital requirements. Here's how Scovill meets them . . .

1 *Do they offer economical, trouble-free operation?* Scovill was the first to design and manufacture couplings for modern hose—and is, today, the nation's leading supplier of fuel oil and gas pump couplings. Scovill has more first-hand, practical knowledge on correct application, use and maintenance of hose couplings than any other supplier. The new 1 3/8" coupling by Scovill has positive, permanent anchorage. Its ferrules are of high strength, cold drawn copper alloy with straight sides that parallel the hose body. Both sections have wide octagonal facets for tightening with ordinary wrenches. Scovill's Full-Flow design permits uninterrupted flow and assures mechanical strength of entire assembly. 2 *Are they available for immediate delivery?* Scovill maintains the industry's widest network of sales offices and warehousing facilities. A full stock of couplings is always on hand —from 3/4" to 3" in fuel oil couplings . . . and all standard sizes in gas pump couplings. All orders for couplings are shipped without delay anywhere in the U. S. or Canada! 3 *Is fast service and expert advice available?* Scovill maintains the largest—and finest—sales force in the industry; they are ready to serve you when and where you want. *For details, write: Scovill Manufacturing Company, Industrial Couplings Division, Waterbury 20, Conn.*



Hose couplings by **SCOVILL**

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Eagle-Picher manufactures a comprehensive line of both lead and zinc compounds for the rubber industry. Rigid product control is maintained from the ore to the finished product. More than a century of experience assures you of customer service unequalled in the field.

Zinc Oxides	Litharge
Basic White Lead Silicate	Sublimed Litharge
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TEmple 4-8850

30 Miles Northeast of AKRON.

New Products

New Firestone Champion Nylon Tire

An economy-priced nylon tire, called the Firestone Champion Nylon, was recently announced by The Firestone Tire & Rubber Co., Akron, O. This new replacement tire is reported to offer a greater degree of tire safety to the economy-minded tire buyer.

The new low-price tire will be manufactured in both black and white sidewalls in the same popular rim sizes as its rayon counterpart, 6.70, 7.10, 7.60-15-inch and 6.00-16-inch plus a new size, 7.50-14-inch for 1957 and more recent automobiles, according to Earl B. Hathaway, vice president in charge of sales at the Firestone company.

New "Super Hi-Tred" Truck Tire

McCreary Tire & Rubber Co., Indiana, Pa., has developed a new tire for heavy trucks, designated the "Super Hi-Tred." The new tire is made with either nylon or rayon tire cord to provide dependable performance for heavier trucking requirements.

The rubber is specially compounded to provide extra-long mileage on the original tread, and the tough natural rubber compound is said to make repeated retreading safely possible. Special road-gripping tread design gives the tire superior traction for more positive drive and surer stops, according to McCreary.

New Materials

(*Continued from page 44*)

Dylex K-40 Latex for Carpet Backing

A new SBR latex designed to meet the requirements of the textile industry for a latex which will produce a soft "hand," yet not require vulcanization, is now offered by the plastics division, Koppers Co., Inc., Pittsburgh, Pa. Known as Dylex K-40, this product fills the need of a latex which will produce a more pliable carpet backing, especially where scrim is applied, reports the manufacturer. Dylex K-40 is also finding application in the upholstery field.

Available only with an antioxidant already incorporated into it, Dylex K-40 is reported to have successfully passed rigid aging tests and to retain its flexibility under extreme aging conditions in laboratory tests and field trials. Koppers is now making it commercially available at the same price as other latices of the non-vulcanizing type.

Additional information may be obtained from the manufacturer.

Ammonium Stearate in Powder Form

Ammonium stearate, though not a new commercial chemical, is now available for the first time in a dry powder form from Boston Chemical Products Co., Boston, Mass. Produced in pilot-plant quantities, this finely divided form is available to industry in 50-pound multi-walled paper bags.

This dry-form product has a higher melting point than most metallic stearates and can be dispersed in hot water without the need of a surface active material. This ammonium stearate is metal free, and upon the application of heat above 190° F. it decomposes to ammonia gas and stearic acid, which is completely water insoluble.

Ammonium stearate is a tan-colored wax-like solid. It is dispersible in hot water and is soluble in hot toluene. Its specific gravity is 0.89, and it has a melting point of 73-75° F.



Strong Restraining Influences...

Roebling Hose Reinforcing Wire

Roebling Hose Wire, Hose Reinforcing Wire and Hose Wrapping Wire bear the stamp of Roebling's strict attention to constant uniformity. As with all Roebling wire products, each is wholly Roebling-made and Roebling-controlled, from open hearth to packaging. Tensile strength and forming qualities, finish and gage are of an excellence that proves itself in use.

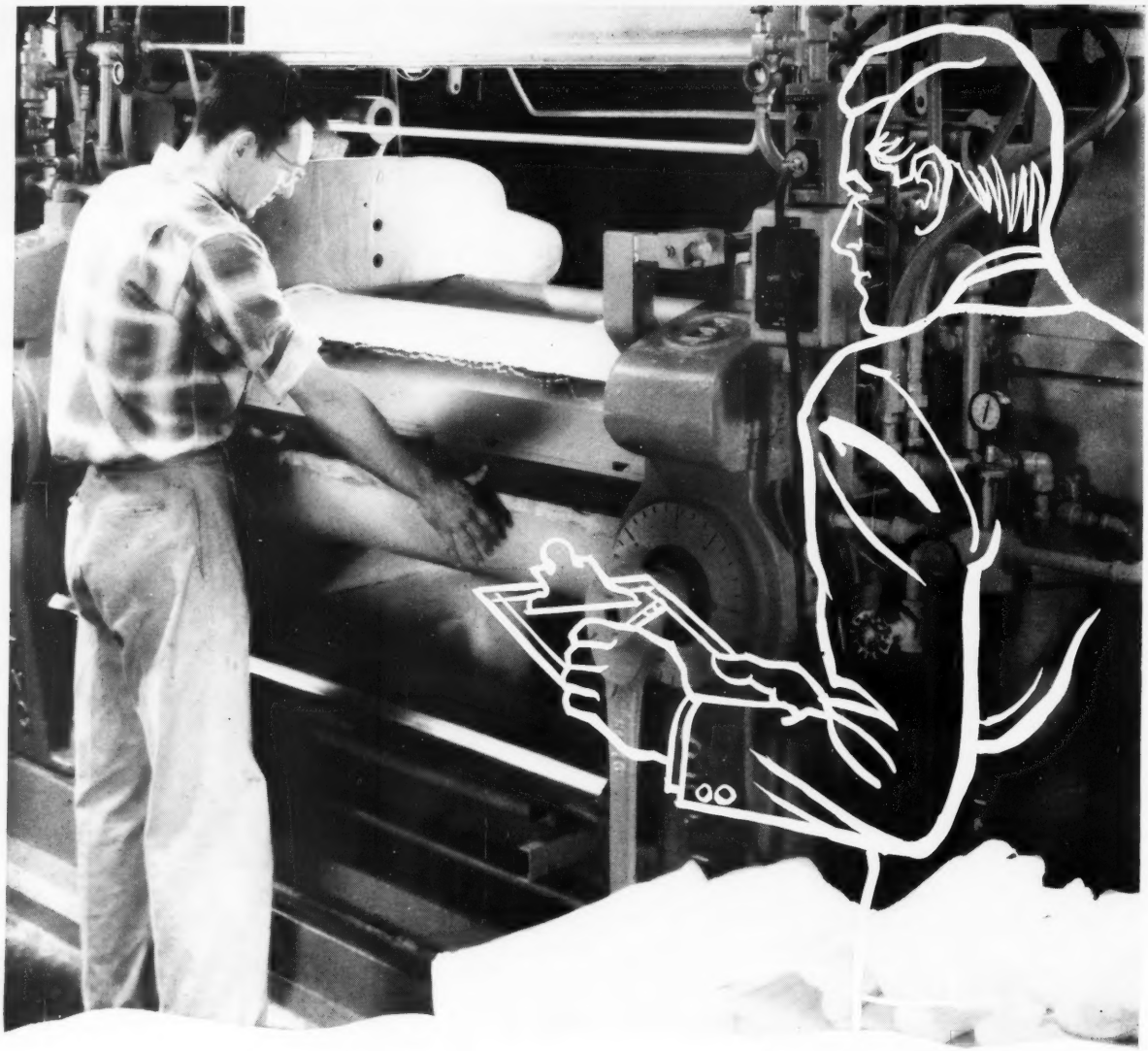
Resistance to internal and external pressures and wear are what you look for in hose wires and what you pay for. With Roebling, you *get* them.

For further information on these and other Roebling quality products, write or call Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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HOW THE SILICONES MAN HELPED...

CUT SILICONE RUBBER INVENTORIES AND SPEED DELIVERIES

Until recently, the rubber fabricator had just two methods of obtaining silicone rubber compounds expressly suitable for specific products. He might purchase gum stock and formulate his own compounds, or he could buy a variety of standard stocks with properties as close as possible to his requirements.

Now every fabricator can readily achieve the rubber compounds best suited to the goods he produces. The new method is a complete *system*. It consists, first, of a basic UNION CARBIDE silicone rubber compound, or "masterbatch," and second, of easy-to-understand data that permits any fabricator to mix and fit ingredients to meet his needs perfectly.

Benefits: Inventories are reduced. Deliveries can be made faster. The least expensive ingredients for the job are always employed. Harassing technical studies and trial-and-error tests are slashed. There's strict control and accurate estimating of compounding costs, invaluable in a highly competitive market.

This unique method is another of the many ways the UNION CARBIDE Silicones Man is helping rubber fabricators. Sound interesting? Please write for details to Dept. DS-9904, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y.

UNION CARBIDE **SILICONES**

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HARCHEM SEBACATE PLASTICIZERS WILL GIVE YOURS THIS UNIQUE QUALITY

Extend the life and the original looks of your products and you build customer good will that reflects itself in greater sales and profits. Nothing will give them more stability, more protection against the inroads of age than Harchem Sebacate Plasticizers. Whether you seek resistance to heat, cold, water, weather or physical abuse, the key to your problem can be found in the chart of four Sebacic Acid Esters found below.

Plasticizer	Specific Gravity 25°/25°C ±.003	Viscosity 25°C, cps	Compatible With	Outstanding Characteristics
Dibenzyl Sebacate	1.055	21-22	Polyvinyl Chloride and Copolymers, Polyvinyl Butyral, Synthetic Rubbers	Excellent Solvation, Very Low Volatility, Permanence, Good Electricals, Low Temp. Flexibility
Dibutyl Sebacate	0.935	7.9	Vinyl Resins, Cellulose Acetobutyrate, Synthetic Rubbers, Rubber Hydrochloride, Polymethyl Methacrylate	Low Temp. Flexibility, Excellent Aging Qualities, Non-Toxic
Dimethyl Sebacate	0.986*	3.54 @30°C	Vinyl Resins, Synthetic Rubbers, Cellulose Nitrate, Cellulose Acetobutyrate, Acrylic Resins	High Solvency and Efficiency, Wide Compatibility, Concentrated Source of Sebacyl Radical
Dioctyl Sebacate	0.913	17.4	Polyvinyl Chloride and Copolymers, Polyvinyl Butyral, Synthetic Rubbers, Cellulose Nitrate, Cellulose Acetobutyrate	Excellent Low Temp. Flexibility, Low Volatility, Excellent Soapy Water Resistance, Good Electricals

*30°/20°C

Columbian Carbon Company, Distributor To The Rubber Industry

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CHEMICAL MATERIALS CATALOG PAGES 173-175

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DRY MIX
GENTRO-



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Rubber processors across the nation report amazing reductions in mixing and processing time with steam-whipped Gentro-Jet black masterbatch. This time savings means greater production economy . . . higher profits for you. Let us show you how high-dispersion Gentro-Jet can help you make more money . . . write or call today!

GENTRO-JET BLACKMASTERS OFFER:

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Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* • **GENTHANE** *polyurethane elastomer* • **ACRI-FLO** *styrene-acrylic latices* • **VYGEN PVC** *resins* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*

Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

NEW FOR YOUR SPECIAL MOLD RELEASE PROBLEMS!

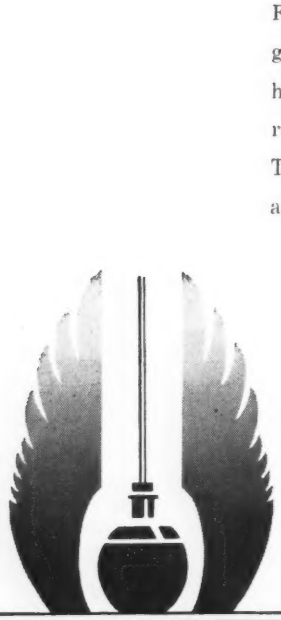
We have found MR-22 a highly effective release agent. It cuts down both time and cost, is excellent for covering mill guides, eliminates sticking of adhesive masses, reduces "down time" and clean outs. MR-22 is ideal for release of hard rubber molded products, will outlast molds and mandrels. Spray coating of colored stock is unnecessary because MR-22 releases them with a high gloss surface. In molding small multicavity tractor tread parts, MR-22 permits up to 90 heats without loss of its superior release properties. Parts usually blown out with air pressure after using other parting agents, actually fell out of molds treated with MR-22. As a polyurethane release agent it gives superior performance. Manufactured by: Peninsular Silicones, Inc. Sold by The C. P. Hall Co., exclusive distributors.

NEW MAGNESIA CURES IN VITON® A ARE MAGLITES® Y, D AND M.

Various grades of magnesia perform differently in Viton, producing varying degrees of activity related to specific surfaces. The end-use of the Viton product determines which Maglite is best.

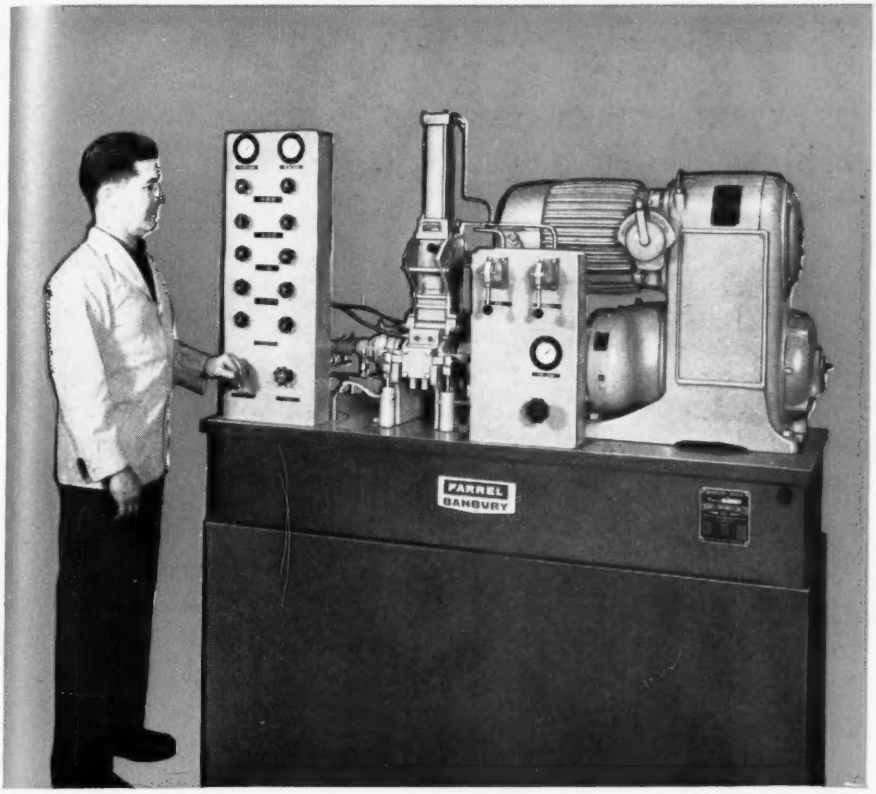
With Viton A and 1.5 phr Diak No. 1 Maglite Y gives superior results for low compression set . . . For non-supported articles in hot air service . . . For parts exposed to di-2-ethylhexyl sebacate . . . For general mechanical goods where best balance of properties are required for heat, hydraulic fluid, lubricant and fuel resistance. Maglites D or M are recommended for fabric coated or supported sheet for hot air applications. They show little or no modulus increase, only slight increase in hardness and no loss in elongation during exposure to hot air. Loss of tensile strength should not be critical since they are supported. Both also give outstanding service in silicate-ester hydraulic fluid (MLO 8200) whether supported or not. Manufactured by: Merck & Company, Inc. Sold by The C. P. Hall Co. For more complete details write for our new Bulletin #5821A entitled "Magnesia Cures in Viton® A."

Viton® A is a registered trademark of the E. I. du Pont de Nemours & Company
Maglite® is a registered trademark of Merck & Company, Inc.



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Stainless-steel hopper, vari-drive motor and control panel make the new Midget Banbury a complete unit that will produce mixes comparable with those obtained in production-size machines.

New midget Banbury

broadens Farrel line of laboratory mixers

With the introduction of the newly designed Midget Banbury® mixer, Farrel's line of equipment is as broad as your requirements.

Thanks to a 7½ HP, vari-drive motor, giving any long-rotor speed from 45 to 336 RPM, the Midget is a truly versatile mixer, permitting a broad scope of experimental work. It will mix smaller batches than the other two laboratory sizes and is, hence, ideal for working with high-cost raw materials or for color matching.

Also, the Midget requires only minor modifications to make it suitable for unusually high temperatures—up to 600°F for circulating-oil system, and for stock temperatures up to 800°F.

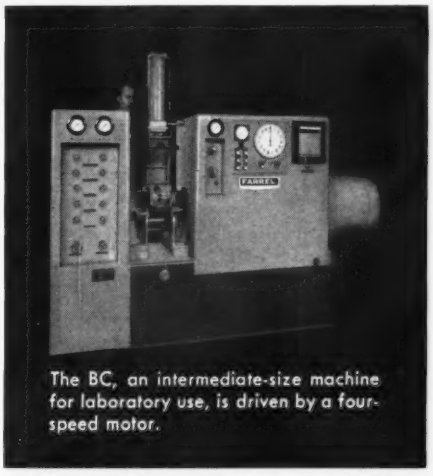
Standard design features include a pneumatically operated front swing side and a stainless-steel hopper with 3″ diameter air-operated floating-weight cylinder. The complete unit is mounted on a fabricated-steel bedplate.

Ask for details of any of the laboratory Banburys shown here.

FARREL-BIRMINGHAM COMPANY, INC.
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Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
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FARREL®



The BC, an intermediate-size machine for laboratory use, is driven by a four-speed motor.



The OOC is the largest of the laboratory mixers. It is furnished with a two-speed drive.

FB-1190



Shown here is one of 13 completely equipped new laboratory units which Neville has recently built as part of a move to bolster basic research. New products are born here—old ones improved.

New Neville Research And Service Facilities Mean Better Products For You

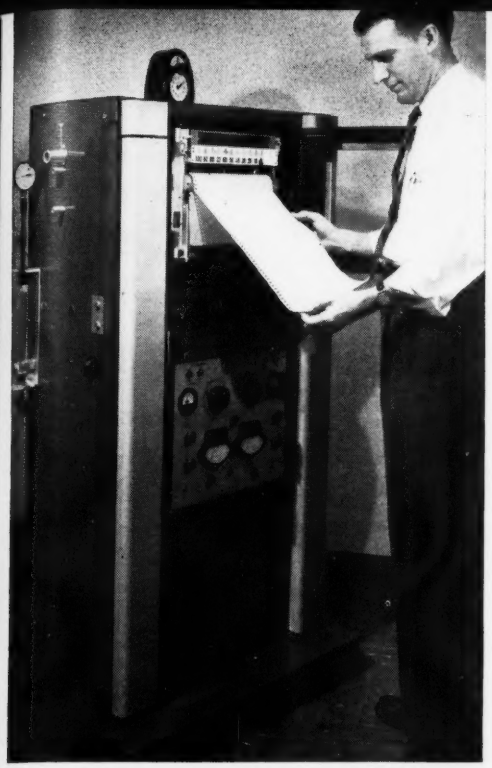
When Neville Chemical Company built its unique office building and research center on Neville Island in Pittsburgh, it did so with its customers in mind. It placed all research, technical service, general administration, sales and even a pilot plant under one roof for quick communications and good coordination. This adds up to better and faster service for you.

Technical facilities were greatly enlarged and divided into four basic sections . . . Technical Service, Research, Process Development and Laboratory Service. In the last three departments, Neville scientists and technicians are constantly striving to find new polymers and chemicals to increase the ability of Neville products to improve those of its customers. In addition, these departments are concerned with the development of new processes, pilot plant studies and analytical research. Through the efforts of this group, Neville developed the country's first commercial process for the production of high purity Indene and Indene derivatives.

The Technical Service Department spends a large measure of its time in technical assistance to our customers. Whether their products are rubber goods, coatings, floor materials, adhesives or any other, Neville studies them for application with our products and for possible improvement. The people in Technical Service pride themselves on often solving problems before customers are aware of their existence.

Neville's thirteen completely new and modern laboratory units function alike for basic research, process development, technical service, laboratory service, and isolating new chemicals or polymers. The laboratories are arranged in a continuous double line with the advanced design pilot plant at the end. Thus, when new polymers have been discovered and studied, they subsequently proceed from one step to the next and continue down the hall to the pilot plant where the commercial feasibility of manufacture is established. In addition to this, the Quality Control Laboratories, which maintain separate quarters in the plant, are constantly at work checking to be certain that every Neville product will conform accurately to specifications.

Much of the benefit of Neville's new facilities could not be readily translated into customer profit were it not for the work of the technical representatives. These highly trained men act as liaison between your plant and the new Neville Island Center. You will find it pays to ask a member of this technical service staff to visit you and bring your formulation problem back to the laboratories for solution.



In the basic research department of Neville's new center, scientist takes a reading from a new Chromatograph to separate and determine chemical components. Not shown is an advanced new infra-red spectrophotometer for even closer identification.



In a room with specially controlled humidity and temperature, an Instron Testing Machine determines the tensile, modulus, elongation and flexual strengths of basic materials from 4 lb. to 10,000 lb. load.



Key men in translating Neville's new facilities to better service are its corps of technical representatives. One member of this highly-trained field staff is shown here assisting a customer.



Under constant use at Neville is a Weather-O-Meter in which samples of rubber goods, coatings and many other products undergo aging under accelerated weather conditions.

Resins — Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Styrenated, Alkylated Phenol • **Oils** — Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents** — 2-50-W Hi-Flash*, Wire Enamel Thinners, Nevsolv* • **High Purity Indene.**

*Trade Name

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NEW Hopper Loader

Ideal for small parts, moldings, etc., the GOODMAN Vibratory Feed INSPECTION TABLE pays for itself in a few months! Inspection is much faster, yet requires fewer operators. Work flow is smoother, quality control improved, inspector fatigue reduced. An efficient addition to every inspection department.

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USERS REPORT:

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- "In an emergency we inspected 250,000 moldings in just 2 hours, with four inspectors."

Write for Folder and Prices!

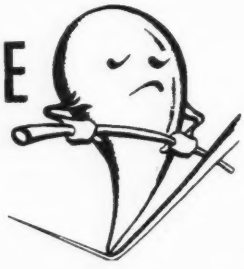
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RIDACTO is especially effective in equalizing the vulcanization of mixtures of SBR and natural rubber. RIDACTO is more active toward SBR and consequently serves to balance the vulcanization of the two rubber hydrocarbons.

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SPENCER PRODUCTS CO., INC.

P. O. BOX 339 RIDGEWOOD, NEW JERSEY

Another new development using

B.F.Goodrich Chemical *raw materials*



Line of Pendent SAFE switches with housing of Hycar are manufactured by Joy Manufacturing Company, Electrical Products Division, St. Louis, and distributed by Graybar. Switches are available in 4- and 6-button models with choice of lettered legends. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

For extra safe, improved operation

New pendent switch is encased in Hycar rubber

This new pendent switch is designed for use on hoists and other devices where suspended or portable switches are required. It is encased in a housing made from tough, resilient Hycar nitrile rubber.

Because Hycar permits such accurate molding, "O" ring seals are molded right in to make the switch watertight. Like any product made of Hycar, this housing is unusually resistant to oils, greases, acids and other corrosives. Unlike other materials tested, Hycar will not harden or stiffen at low temperatures. Pushbutton diaphragms stay flexible.

Another important advantage to the design of these switches is the resilience provided by the covering which protects the switch from damage even if it hits a hard object.

Here's another example of how Hycar nitrile rubber is improving products and opening new markets. For further information, write Dept. FA-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar

Rubber and Latex

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

News about

B.F.Goodrich Chemical *raw materials*

for:

better flow

better extrusion

better calendering

USE

HYCAR 1312

A LIQUID NITRILE POLYMER

As a plasticizer both in nitrile rubber and vinyl plastisols, Hycar 1312 is non-extractable, non-migrating and non-volatile. It provides nitrile rubber compounds with excellent building and knitting characteristics—has good tack. Examples of applications where it is being used include tank linings, building of rolls and fabrication of hose.

A carboxy modified variation, Hycar 1300x2 possesses properties similar to those of 1312, but with the added advantage of cross-linking through the carboxyl group by metallic oxides, epoxy resins, and other similar agents.

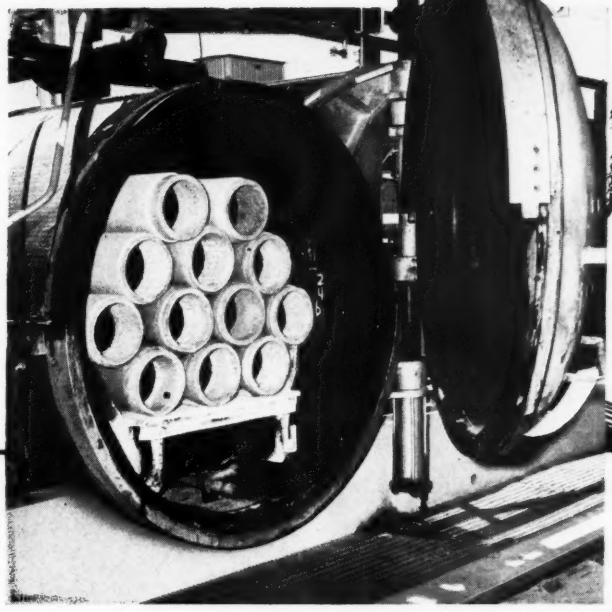
For more information about either of these Hycar polymers, or other Hycar rubbers and latices, write Dept. FA-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

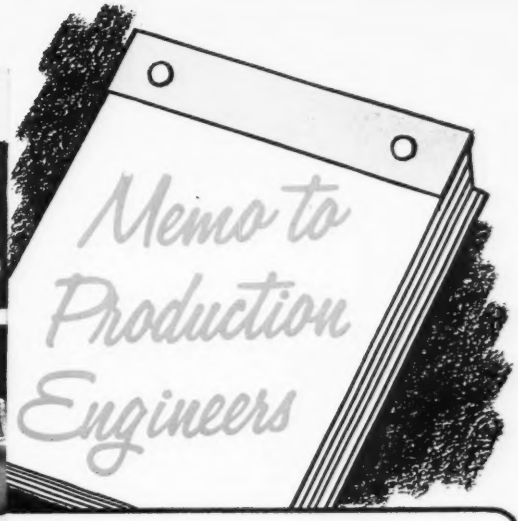
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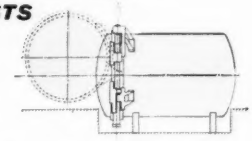




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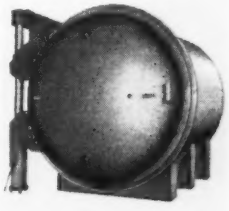


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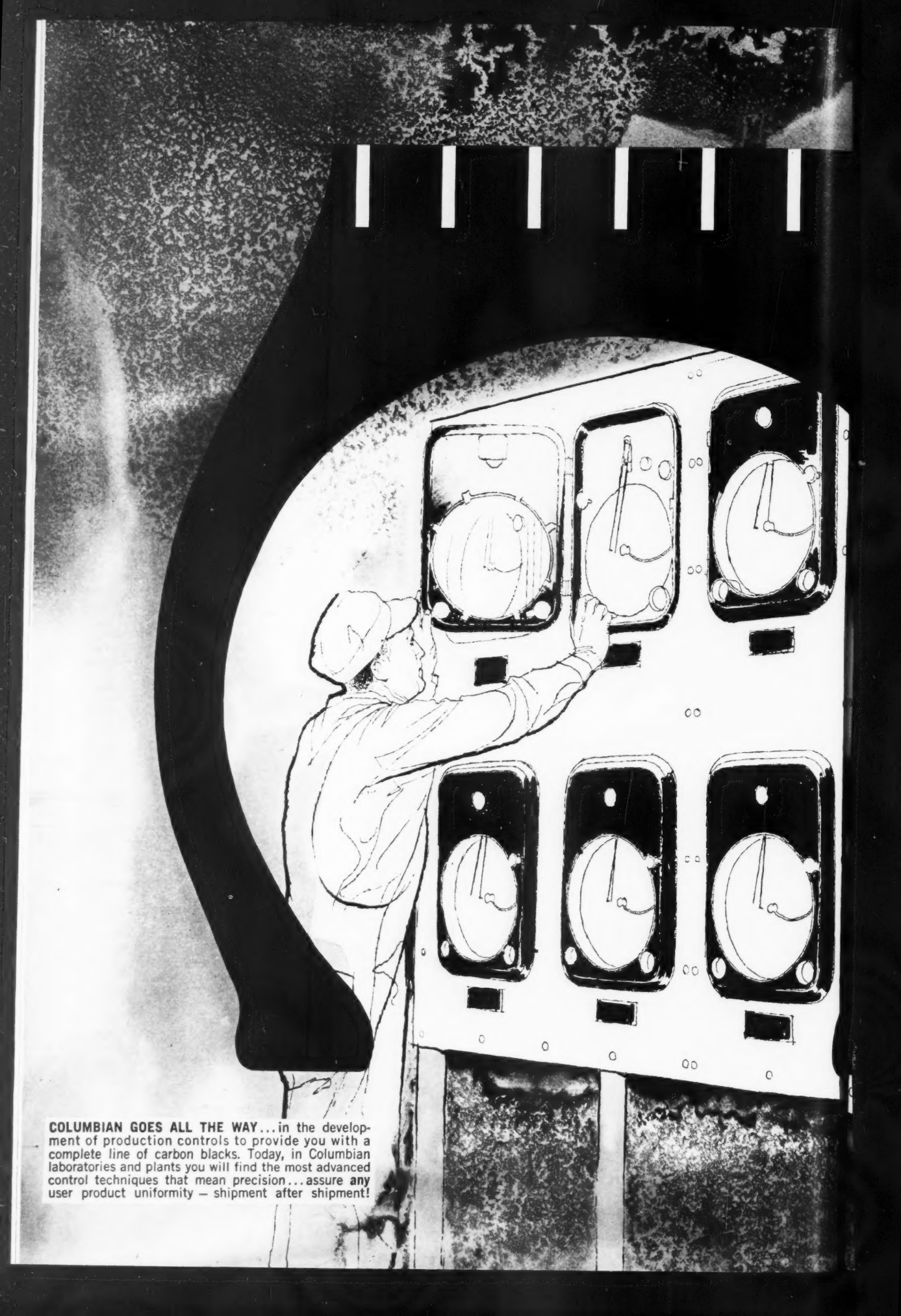
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ANALYSIS: IGNITED BASIS						
SiO_2	0.04%	0.4%	0.7%	2.4%	0.11%	0.03%
Fe_2O_3	0.03%	0.2%	0.4%	0.07%	0.02%	0.02%
AL_2O_3	0.11%	0.1%	0.1%	0.04%	0.03%	0.06%
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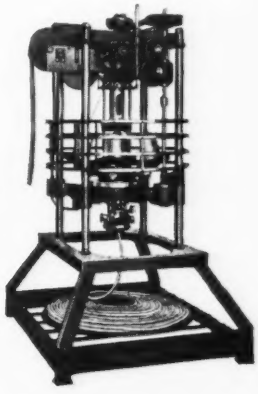
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RUBBER WORLD
EDITORIAL

Rubber Industry Indicates Confidence in the Future

THE high level of activity of the rubber industry in 1959 is being confirmed by recent financial reports of many of the companies in the industry. The First National City Bank of New York in its March Monthly Letter on Business and Economic Conditions reports that the net income after taxes of 23 tire and rubber product corporations amounted to $261,996,000 in 1959, as compared with $207,488,000 in 1958, an increase of 26%.

The optimistic outlook for 1960 and beyond, as expressed at the beginning of the year, is apparently continuing, in spite of some of the paradoxes in the general business situation during the first quarter of the year. For example, the first-quarter performance of the automotive industry, upon which much of the rubber industry's activity depends, was somewhat erratic. Production was at a very high rate in January and February, but lagging passenger-car sales in January and the accumulation of near-record dealer inventories of 925,000 cars by February 20 caused curtailment of assembly operations at that time. When it became known that sales of passenger cars for the first 20 days of February were 20% higher than in the corresponding 1959 period, automotive production headed upward in March.

The record earnings of 1959 and the expectation of average high-level activity throughout 1960 and beyond has encouraged the rubber industry to step up its new plant and equipment expenditures this year. A joint report by the United States Commerce Department and the Securities & Exchange Commission on March 11 estimates that rubber industry expenditures for these purposes in 1960 would amount to $254 million, about one-third more than the $190 million spent in 1959 and a record high. It would be interesting to know, however, if the portion of this $254 million to be spent in this country is any lower than in previous years, in view of the present emphasis of foreign plants.

J. W. Keener, president and chief executive officer of The B. F. Goodrich Co., in announcing in March that this company would spend a record $50 million in 1960 on new plant and equipment, added that Goodrich expected to spend about the same amount for the next five years for such improvements.

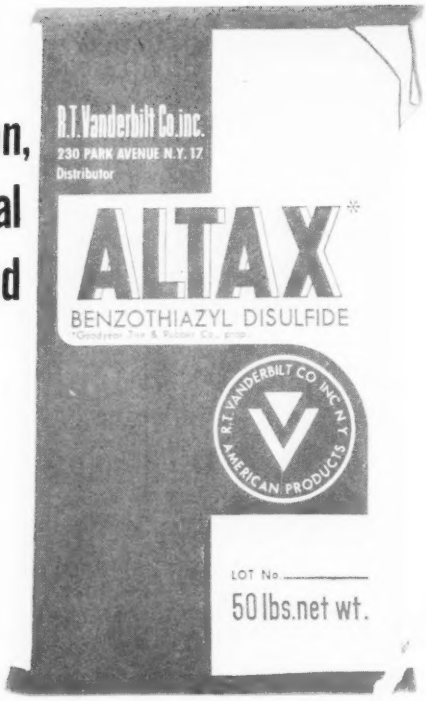
H. E. Humphreys, Jr., chairman of the board of United States Rubber Co., told the *Wall Street Journal* on March 14 that first-quarter sales of $250 million were indicative of what that company should do for the entire year. If this expectation is realized, U. S. Rubber would become the third company in the industry with sales of more than $1 billion a year.

Short of the unexpected, therefore, the industry's output of tires and other rubber products, synthetic rubber, plastics, metal products, and chemicals will probably reach new highs in 1960. Suppliers to rubber industry companies should find this market unusually attractive.

R. G. Seaman

EDITOR

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RUBBER WORLD

Contrasts in the Response Of Elastomers to High-Temperature Vulcanization[1]



Frank B. Smith

Trend toward HTV emphasizes importance of selecting right elastomer and curing system

By FRANK B. SMITH

Naugatuck Chemical Division,
United States Rubber Co., Naugatuck, Conn.

IT IS well known to production people and to process engineers engaged in manufacturing rubber products that the output of curing operations can be greatly increased by elevating the temperature of vulcanization. For example, work done in the 1920's led to the curing of rubber-covered wire at 400° F. using a continuous vulcanization (CV) process.[2] Highly accelerated compounds capable of complete vulcanization in 15 seconds at 400° F. are used in the insulated wire industry.

More recently, the application of high-temperature vulcanization methods has been vigorously pressed in the tire industry. While exact curing cycles are closely guarded secrets, it can be stated that passenger-car tires are presently vulcanized at temperatures up to 388° F. (200 psi. steam pressure) using press cycles of the order of 15-25 minutes' duration. New automatic presses[3] which shape and then cure the tires at high temperatures permit large economies in labor and productivity. Further reductions in curing cycles are anticipated since the process engineers and rubber technologists continue to develop improved methods of high-temperature curing. It appears that the trend to higher-temperature vulcanization will not only continue, but tend to expand into other lines of rubber products.

Considering the economic advantages which a given company may gain by a major advance in the high-temperature curing of tires or other rubber goods, it is not surprising, therefore, that there have been only a few disclosures on high-temperature curing technology.

A. N. Gray[2] has published on the process of curing insulated wire at 400° F.; A. E. Juve and B. S. Garvey,[4] as well as J. F. Svetlik and H. E. Railsback,[5] have reported data on the vulcanizing characteristics of SBR compounds in the temperature range of 250-350° F. These authors found that the physical properties of SBR compounds are affected by curing temperature. Also, L. A. Brooks, J. L. Tronson, and A. C. Rowley[6] have reported on the efficiency of certain accelerators in the 400° F. curing of wire insulation compounds. In view of the widespread use of high-temperature curing, there appears to be a great need of pertinent data illustrating the effect of high-temperature vulcanization on the quality of rubber products.

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[1] Presented before the International Rubber Conference, Washington, D. C., Nov. 13, 1959. Published by permission of the American Chemical Society, who holds copyright on the paper as published in "Proceedings of International Rubber Conference."

[2] *Mech. Eng.*, Aug., 1953, p. 625.

[3] For example, Bag-O-Matic tire curing presses, McNeil Machinery & Engineering Co., Akron, O.

[4] *Ind. Eng. Chem.*, 36, p. 212 (1944).

[5] *Rubber Age (N. Y.)*, 78, 889 (1956).

[6] *Ibid.*, 78, 897 (1956).

This paper reports additional information which will be of assistance to rubber technologists in selecting and compounding elastomers for high-temperature curing. The work illustrates certain characteristic differences between elastomers and between curing systems which have been differentiated in preliminary work in this laboratory. Relatively simple tire compounds were employed in this investigation, and only a few basic physical properties were measured. Nevertheless certain fundamental trends were found.

High-temperature vulcanization in the context of this paper signifies the curing of compounded elastomers in the range of 350-500° F., as contrasted with the standard or normal temperature of vulcanization of 292° F.

Experimental Details

Typical tire tread and carcass compounds were vulcanized at temperatures from 292-500° F. The compounds were cured in a steamheated platen press for temperatures up to 350° F.; above 350° F. an electrically heated two-platen press was used.

The preparation of samples, curing, and testing was done in accordance with the recommendations of ASTM D 15-57T.[7] Physical properties tested included (a) stress at 300% elongation, (b) tensile strength, and (c) elongation at break. Sulfur analyses were also run in certain of the tests in an attempt to characterize the role of sulfur in the mechanism of vulcanization at high temperatures.

Elastomers studied include (a) smoked sheet natural rubber, (b) styrene-butadiene rubber (SBR), (c) mixtures of smoked sheets and SBR, (d) Enjay Butyl 215,[8] (e) nitrile-butadiene rubber (NBR),[9] and neoprene.[10] Contrasts in the response of these compounded elastomers to high-temperature vulcanization were studied in terms of the physical and chemical properties listed above. Several curing systems were investigated.

TABLE 1. TYPICAL PASSENGER-CAR TIRE COMPOUNDS USED, SERIES 1

Compound	Passenger Tread 1	Passenger Carcass 2
#1X Smoked Sheets	—	50.00
SBR 1711	68.75	—
1551	—	50.00
1500	50.00	—
Naugatuck #628 Reclaim*	—	30.00
HAF Black	25.00	—
ISAF Black	30.00	—
FEF Black	—	35.00
Stearic acid	1.00	1.50
Paraflux†	3.00	3.00
Flexamine‡	1.00	—
Naugawhite§	—	1.00
XX268 zinc oxide	3.00	4.00
MBT (mercaptobenzothiazole)	.70	.60
DPG	.50	.25
ulfur	2.00	3.50

* Whole tire reclaim, Naugatuck Chemical Division.
† Saturated polymerized hydrocarbon, C. P. Hall Co., Akron, O.
‡ 65% Diarylamine-ketone reaction product; 35% N,N'-diphenyl-p-phenylene diamine, Naugatuck Chemical Division.
§ Alkylated-bis-phenol antioxidant, Naugatuck Chemical Division.

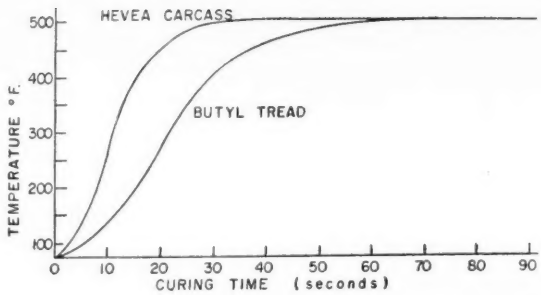


Fig. 1. Temperature rise in ASTM tensile slabs during 500° F. vulcanization as made by instantaneous thermocouple measurement

Vulcanization Time-Temperature Relations

F. S. Conant, J. F. Svetlick, and A. E. Juve[11] in a special ASTM task force report summarized factors affecting the problem of obtaining equivalent cures in specimens of various shapes. These authors developed a nomograph which permits the estimation of lag time or incubation time for curing rubber articles of varying shapes and compositions. This nomograph shows that the thermal diffusivity or heat conductance of rubber compounds is very important in establishing equivalent cures since thermal diffusivity controls the rate of conductance of heat throughout the article. Values for thermal diffusivities (in inches²/min.) are given in the cited reference, all of which are quite low (e.g., from 0.0015 to 0.0131 for *Hevea* rubber tread stocks). It is stated that thermal diffusivity values increase with increased pigment loading and decrease with increasing temperature. The work covers the temperature range from 220-340° F.

In transposing times from one cure temperature to another, process engineers often use charts detailing time-temperature relations based on a temperature factor such as 18° F. for doubling the cure rate. Such factors are derived from experience with specific compounds and curing processes; so they may not be generally applicable to all compounds and all curing processes. Charts applying to the vulcanization range of 350-500° F. have not yet been developed as far as can be determined by the writer.

In the absence of any guideposts, it was decided to investigate the possibility of obtaining equivalent cures over the temperature range of 292-500° F. An equivalent cure series was calculated for a number of temperatures in this range based on a factor of 2.0 times the curing time for each increment of 18° F. It became evident that technical difficulties of manipulation in the molding operation made it unlikely that precise

[7] American Society for Testing Materials, Philadelphia 3, Pa.
[8] Enjay Co., Inc., New York, N. Y.
[9] Naugatuck Chemical Division, U. S. Rubber.
[10] E. I. du Pont de Nemours & Co., Inc., elastomer chemicals department, Wilmington 98, Del.
[11] RUBBER WORLD, 137, 856 (1958).

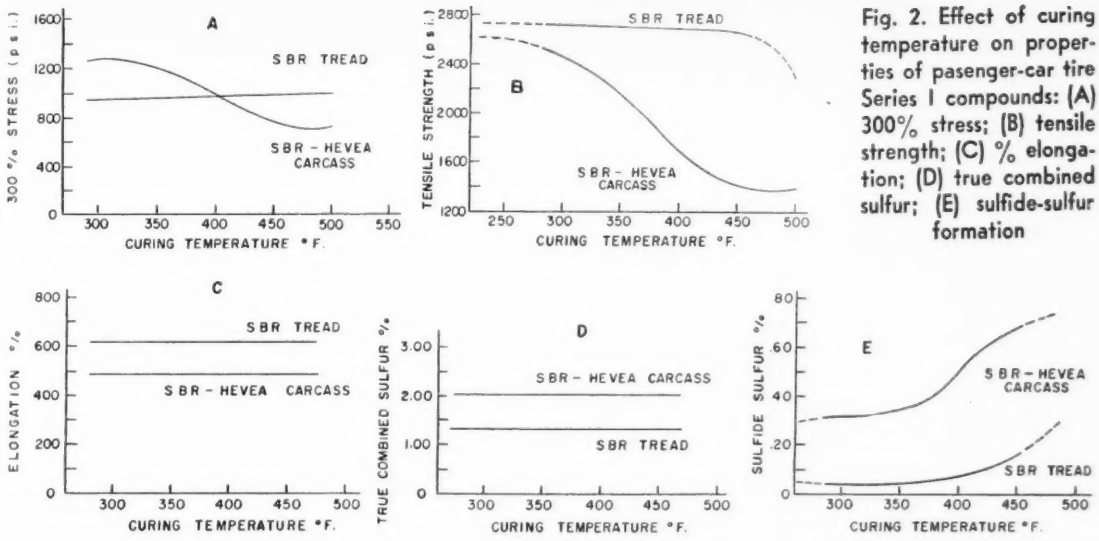


Fig. 2. Effect of curing temperature on properties of pasenger-car tire Series I compounds: (A) 300% stress; (B) tensile strength; (C) % elongation; (D) true combined sulfur; (E) sulfide-sulfur formation

control of vulcanization could be exercised with our equipment for cures less than 30 seconds. It became evident also that contrary to conditions prevailing at more normal curing times and temperatures, the factor of thermal diffusivity produced a large lag in heat transfer in the ASTM test sheets at the higher temperatures. The magnitude of this effect for several compounds was measured with an instantaneous thermocouple recording instrument. The thermocouple (12 gage wire) was placed between two 0.038-inch sheets of the test compound; the assembly was firmly adhered together and cured. The curves for the temperature rise during vulcanization at 500° F. of (a) a natural rubber carcass compound and (b) a butyl rubber tread compound are shown in Figure 1.

The curves in Figure 1 demonstrate that temperature-time lag is significant in curing ASTM slabs at 500° F., and it appeared that it would be extremely difficult to obtain a uniformly cured vulcanizate (at optimum cure) at the higher temperatures, except in thin test specimens. At normal curing temperatures and times, temperature lag is generally considered to be negligible in ASTM slabs.[11] At 500° F., where cures as low as 10-30 seconds may be considered feasible, these temperature-time lags cannot be overlooked. It would appear then that one of the desirable compound characteristics for high-temperature vulcanization would be resistance to overcure or reversion since the vulcanizate surface would undoubtedly be subjected to overcure before the interior reached optimum cure.

Subsequent work was planned with the practical limitations of press operation and temperature conditions in mind. The curing cycles selected and reported herein are not to be considered as an equivalent cure series.

High-Temperature Vulcanization (HTV) of SBR Tread and *Hevea*-SBR-Reclaim Carcass Compounds—Series 1

The typical passenger-car tire compounds in Table 1 were selected for study in Series 1. The SBR tread compound is based on a blend of general-purpose cold SBR 1500 and general-purpose oil-extended cold SBR 1711; while the carcass compound contains a blend of *Hevea* rubber and SBR 1551 (non-staining SBR 1500) as the matrix and is extended with whole tire reclaim.

Typical curing conditions selected for the Series 1 tests are illustrated in Table 2; intermediate temperatures were run also.

The individual values for the several physical properties at each cure level were averaged together for simplification of the data presentation. The validity of this method is considered satisfactory for elastomers and elastomer-curing combinations which do not revert. It is probably not so satisfactory for elastomers and combinations of elastomers and curing agents which do revert since there would be a relatively greater chance of missing the optimum cure on slab cures at extremely high temperatures.

Figure 2A shows the effect of curing temperatures in the range of 292-500° F. on stress at 300% elongation. In general, the 300% stress level appears to be relatively stable for the SBR tread over this range of curing temperature. In contrast, the curve for the *Hevea*-SBR compound shows that the higher temperatures of vulcanization exert a relatively deleterious effect on the 300% stress levels of this carcass stock.

Figure 2B illustrates the effect of high temperatures of vulcanization on the tensile strength of these two

TABLE 2. CURING CONDITIONS, SERIES 1 COMPOUNDS

Time of Slab Cures, Min.	Temp., °F.
(1) 15, 30, 45, 90	292
(2) 4, 8, 12, 24	337
(3) 1.5, 2.25, 4.5, 8	365
(4) 0.75, 1.5, 2.25, 4.5	388
(5) 0.75, 1.5, 2.25, 4.5	400
(6) 0.5, 1.0, 1.5, 3.0	450
(7) 0.5, 1.0, 2.0	500

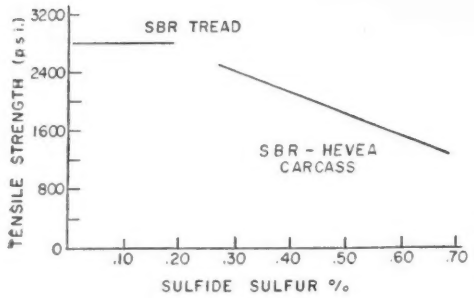


Fig. 3. Relation of sulfide sulfur to tensile of passenger-car Tire Series I compounds

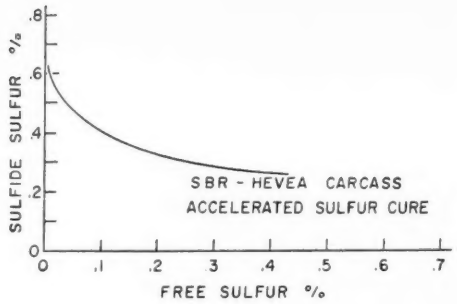


Fig. 4. Relation of sulfide sulfur to free sulfur in tire carcass Series I compounds

TABLE 3. ANALYSIS OF SULFUR IN RUBBER VULCANIZATES

Type	Procedure
(1) Free sulfur	(a) Sodium sulfite digestion (b) React excess sulfite with formaldehyde (c) Titrate sodium thiosulfate iodometrically
(2) Total sulfur	(a) Digest in brominated nitric acid (b) Perchloric acid oxidation (c) Barium sulfate precipitation
(3) Sulfide sulfur	(a) Digest in acetic-hydrochloric acids mixture (b) Absorb H_2S in ammoniacal zinc solution (c) Acidify and titrate H_2S with iodine and thiosulfate
(4) True combined sulfur	(a) Sample from 3(c) above (b) Acetone extraction (c) Total sulfur as above in 2

TABLE 4. SERIES 2 CARCASS COMPOUNDS

Compound Elastomer Type	3 SBR	4 SBR-*Hevea* Blend	5 *Hevea* Rubber
SBR 1500	100	50	—
#1X Smoked Sheets	—	50	100
Naugatuck #628 Reclaim	30	30	—
ZnO	3.0	3.0	3.0
Stearic acid	1.5	1.5	3
Paraflux	3.0	3.0	—
FEF Black	35	35	35
BLE-25*	1.0	1.0	1.5
Pine tar	—	—	5.0
METS (benzothiazyl disulfide)	.80	.70	.70
DPG	.60	.35	—
Sulfur	3.50	3.50	3.50

* Diphenylamine-acetone reaction product, Naugatuck Chemical Division.

TABLE 5. SERIES 2 COMPOUNDS, CURING CONDITIONS

Time, Minutes	Temperature, °F.
45, 90	292
4, 8	350
2, 4	400
1, 2	450
½, 1	500

compounds. The values for the SBR tread compound show little, if any, effect up to 450° F., and even at 500° F. there is only a small drop. In marked contrast, the tensile curve of the *Hevea*-SBR carcass compound indicates that an increase in curing temperature exerts an undesirable effect on this property; the effect is particularly noticeable at temperatures in excess of 350° F.

The effect of the higher vulcanizing temperatures on elongation at break is demonstrated in Figure 2C. There is little appreciable effect here; the averaged values for elongation at break are substantially unchanged over the entire range of curing temperatures studied.

Effect of Cure Temperature on Sulfur Combination

The Series 1 compounds and cures were studied to determine the effect, if any, of increased vulcanizing temperatures on the nature of the sulfur-elastomer cross-link, by means of several methods of sulfur analysis. In elastomers vulcanized with sulfur, the sulfur may be present in several forms depending on (a) the compound, (b) nature of the curing system, and (c) the physical factors of vulcanization, such as time and temperature.

The Series 1 vulcanizates were analyzed for the presence of sulfur in the following forms: (a) free (uncombined) sulfur; (b) sulfide sulfur; (c) true combined sulfur. The true combined sulfur is considered to be that which is actually combined with the elastomer molecules in the form of cross-links or in the hydrocarbon chain. True combined sulfur is defined as non-extractable sulfur which remains in the vulcanizate after both the free sulfur and the sulfide sulfur have been extracted.

Table 3 gives a brief outline of the methods used in these separate sulfur analyses. A more detailed explanation of these methods is presented by V. L. Burger,[12] United States Rubber Co. Research Center, Wayne, N. J.

Figure 2D shows the effect of increased vulcanizing temperatures on the true combined sulfur levels of the Series 1 tread and carcass compounds. No test was made of the 500° F. cured samples. The data demonstrate that on the average the proportion of sulfur

[12] *RC & T Rubber Reviews*, 32, 5, 1459 (1959).

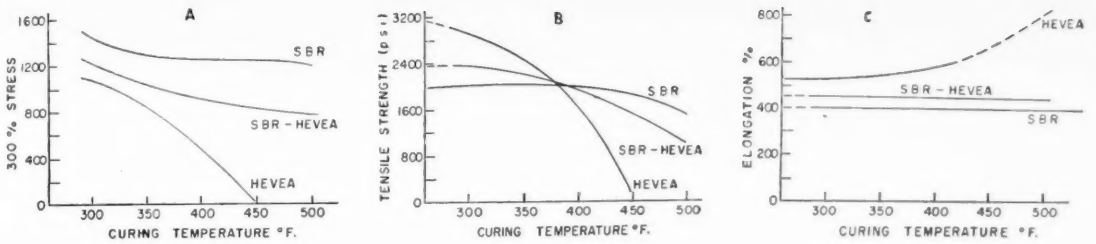


Fig. 5. Effect of curing temperature on properties of tire carcass Series 2 compounds: (A) stress at 300% elongation; (B) tensile strength; (C) % elongation

which cross-links with elastomer, at least in these two typical passenger-car tire compounds, is similar at all curing temperatures tested.

In contrast, the average sulfide-sulfur level tends to increase in these compounds with increase in curing temperature, as shown in Figure 2E. This trend is particularly noted in the case of the carcass componud which contains a blend of *Hevea* rubber and SBR as the elastomeric matrix. The slope of the sulfide-sulfur curve for the carcass compound shows a sharp inflection at about 360° F. curing temperature. The rise in sulfide sulfur for the SBR tread is much less pronounced than for the carcass compound. It is considered that a rise in sulfide sulfur may be associated with reversion of the *Hevea* rubber in the carcass compound during cure at the higher temperatures.

In Figure 3 the relation between tensile strength and sulfide sulfur is demonstrated for these two Series 1 compounds. An approximately linear relation relating sulfide sulfur to tensile strength is shown for both compounds. In the case of the *Hevea*-SBR carcass compound the formation of sulfide sulfur is associated with overcure and reversion of the natural rubber component of this compound, while little or no effect is noted for the SBR tread compound.

Sulfide sulfur may be formed from the residue of free sulfur in the later phases of cure. Figure 4 details the relation of free sulfur to sulfide sulfur for the *Hevea*-SBR carcass compound. The highest levels of sulfide sulfur are associated with the lowest levels of free sulfur. Very low values of free sulfur are indicative of overcure and may be associated with reversion in the case of natural rubber compounds; while SBR is essentially non-reverting so that it would not be expected that this relation would be found for the tread compound.

The Series 1 results show the quality of the SBR tread, as judged by laboratory tests, to be largely unaffected by high-temperature vulcanization; while the same curing conditions are shown to produce a deleterious effect on the quality of the *Hevea*-SBR carcass compound.

Effect of Natural Rubber in Carcass Compounds—Series 2

It was suspected that the lowered quality of the carcass stock in Series 1 under HTV might be associated with the *Hevea* rubber component of the compound. Series 2 compounds and tests were initiated, therefore, to isolate the effect of *Hevea* rubber *per se* in carcass compounds during HTV. The carcass compounds used for the Series 2 part of the study are given in Table 4, and the curing conditions (50° F. temperature increases between 292 and 500° F.) are shown in Table 5.

The effect of the increases in curing temperatures on the stress at 300% elongation of the three carcass compounds is shown in Figure 5A, which demonstrates that sulfur-cured *Hevea* rubber is indeed very sensitive to the higher vulcanizing temperatures. (As in Series 1, the data of Series 2 at each curing temperature were averaged for presentation in this paper.) The stress at 300% elongation values decreases steadily with the all-*Hevea* rubber compound 5 until at 450° F. virtually no cure at all is obtained. In many replicate tests at 450° F. or higher, sulfur-cured *Hevea* rubber vulcanizates always have shown a badly degraded tacky surface with sponginess in the interior of the press-cured slabs. By contrast, the values for 300% stress for the SBR carcass compound of Figure 5A show little effect as the curing temperatures are increased. Compound 4, containing a blend of *Hevea* rubber and SBR, shows an expected intermediate level of 300% stress values between the values for the all-SBR and all-*Hevea* rubber compounds.

Figure 5B presents data on the effect of higher vulcanizing temperatures on the tensile strength of Series 2 carcass compounds. The SBR compound (No. 3, Table 4) shows only a small effect; while the effect of the higher temperatures in lowering the tensile strength values of the *Hevea* rubber compound (No. 5, Table 4) is clearly demonstrated. The all-natural rubber compound shows much higher tensile strength at 292° F. than the all-SBR compound, but with increased curing temperatures the former is subject to a greater loss of tensile strength than the latter, and the curve for the *Hevea* rubber carcass compound intersects the curve for the SBR compound at about 385° F. The curve for the *Hevea*-SBR compound No. 4 is again intermediate and reflects the lowering effect on tensile strength of the natural rubber component of the blend.

Figure 5C shows the averaged values for elongation at break obtained at various levels of cure temperature tests: compounds Nos. 3 and 4 are largely unaffected; while the upper curve for the all-*Hevea* rubber compound shows as inflection in the direction of higher elongation which would normally be associated with reversion of cure.

The Series 2 tests demonstrate the fundamental difference between *Hevea* rubber and SBR in response to

TABLE 6. CONTRASTS BETWEEN SBR AND *HEVEA* RUBBER IN HTV

Elastomer	SBR			*Hevea* Rubber		
	Stress at 300%, psi.	Tensile, psi.	% Elongation at Break	Stress at 300%, psi.	Tensile, psi.	% Elongation at Break
Cured at 292° F., min.						
45	1500	2030	400	1170	2930	530
90	1550	2030	370	1070	2930	530
Cured at 350° F., min.						
4	1140	1930	450	900	2670	550
8	1330	1870	400	800	2330	550
Cured at 400° F., min.						
2	1340	1870	400	500	1580	560
4	1300	2190	450	500	1750	600
Cured at 450° F., min.						
1	1200	1630	400	degraded*	—	—
2	1210	1660	400	degraded*	—	—
Cured at 500° F., min.						
½	1200	1650	400	degraded*	—	—
1	1220	1620	390	degraded*	—	—

* Surface became tacky; interior of vulcanizate was spongy.

higher temperatures of vulcanization in sulfur-cured vulcanizates in that the range of 400-500° F. apparently causes an overcure or reversion of the natural rubber. Practically, the tendency to overcure or revert for a given elastomer should be recognized as a deficiency for applications in HTV.

Contrasting Effects of HTV

More detailed data on the Series 2 tests are shown in Table 6 to illustrate some of the problems involved in judging the effects of HTV. The curing conditions selected produced a reasonable degree of cure for the SBR compound (No. 3, Table 4) although tensile strength did decrease somewhat with increase in curing temperature. The stress at 300% elongation values for the SBR compound were approximately equivalent for all cures except for those at 292° F. The tensile strength and stress at 300% elongation values for the natural rubber compound, however, were drastically reduced with increase in cure temperature. Natural rubber compounds of the type used here revert on overcure and it is quite possible that optimum cure would be passed within a few seconds at the 500° F. curing temperature.

Sulfur Accelerator *vs.* Sulfur Alone—Series 3

It was considered as one facet of the general increase in curing temperatures used in the industry that it might be possible to eliminate accelerators and use sulfur as the sole curing agent. Series 3 compounds feature a comparison of sulfur-accelerator *versus* sulfur alone in the *Hevea*-SBR tire carcass compound of the type of No. 2, Table 1. In Series 3, however, MBT was used as the sole accelerator; no DPG was used.

Figure 6A shows the averaged tensile strength at several temperature curing levels selected, which are similar to those shown in Table 5 for the Series 2

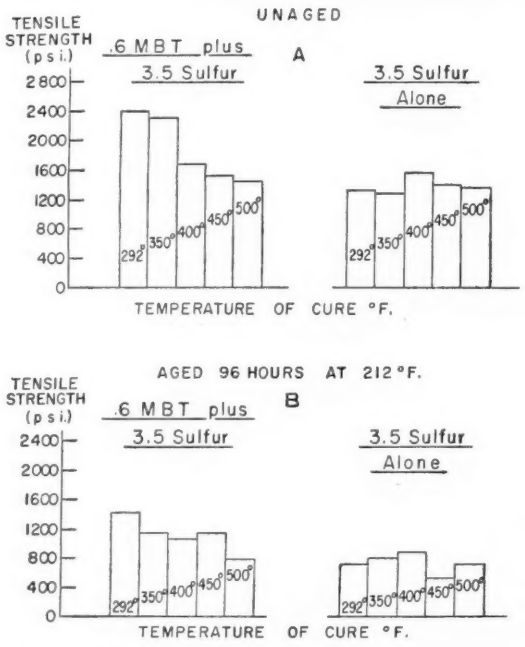


Fig. 6. Effect of curing temperature on tensile strength of passenger-car tire Series 3 carcass compounds: (A) unaged; (B) aged 96 hours at 212° F.

work. Figure 6A illustrates that at temperatures of 400° F. or above there is no essential difference in tensile strength between accelerated and unaccelerated sulfur-cured tire carcass compounds.

The data in Figure 6B shows, however, that the MBT-accelerated compound resists heat aging much better at all levels of curing temperature than the compound vulcanized with sulfur alone. It is considered, therefore, that the thiazole accelerator should be in-

TABLE 7. VARIOUS CURING SYSTEMS FOR *HEVEA* RUBBER, SERIES 4

Compounds No.	6	7	8	9	10
Curing Agent	Sulfur	Resin	YDO	Peroxide	GMF
#1X Smoked Sheets	100	100	100	100	100
FEF Black	40	40	40	40	40
Circo light oil*	4	4	4	4	4
Laurex†	3	3	3	3	3
BLE-25	1.5	—	—	1.5	1.5
Zinc oxide	2	2	2	2	2
Resole resin‡	—	10	—	—	—
YDO [2,2′-methylene-bis-(4-chloro-6 methylolphenol)]§	—	—	6	—	—
MBTS	.5	—	—	—	2.0
Dicumyl peroxide 90%	—	—	—	5.0	—
Sulfur	3.0	—	—	—	—
Stannous chloride dihydrate	—	2	—	—	—
GMF¶	—	—	—	—	3.0

* Sun Oil Co., Philadelphia, Pa.
† Zinc salt of lauric acid, Naugatuck Chemical Division.
‡ Amberol ST 137, t-octyl phenyl resole resin, Rohm & Haas, Philadelphia.
§ YDO, Naugatuck Chemical Division.
¶ p-quinone dioxime, Naugatuck Chemical Division.

cluded in compounds designed for HTV at least for its antioxidant value. This rule would apply only to mercaptobenzothiazole and its derivatives which are known to exert antioxidant value.[13]

It is well known that in curing thick rubber products a temperature gradient exists between the surface and the interior owing to slow thermal diffusivity.[11] It is believed that this fact would in itself necessitate the use of accelerators, especially under extreme conditions of vulcanization, such as at 500° F., where the temperature-time lag factor would be very significant for short cure cycles.

Non-Sulfur Vulcanization of *Hevea* Rubber—Series 4

The Series 2 tests showed that HTV produced an extremely deleterious effect on sulfur-cured *Hevea* rubber compounds. Various other curing systems were therefore examined to determine if this effect might be an elastomer response or merely a characteristic specific to the sulfur-curing system.

The recipes for the compounds evaluated in this Series 4 are given in Table 7, and the curing conditions are summarized in Table 8. As in previous comparisons, the physical properties were averaged for each temperature of cure.

Figure 7 shows that a fundamental difference exists in the vulcanizing behavior of natural rubber when several different curing systems are used. This figure demonstrates that in contrast to the accelerated sulfur-cured system, the resin cured, YDO (a polymethylolphenol), peroxide, and GMF-cured *Hevea* rubber are all relatively stable when press cured at temperatures up to 500° F.

The commercial resole resin used in this work is identified in Table 7 and is covered by United States

TABLE 8. CURING CONDITIONS, SERIES 4

Time, Minutes	Temperature, °F.
45, 90	292
2, 4	400
½, 1	500

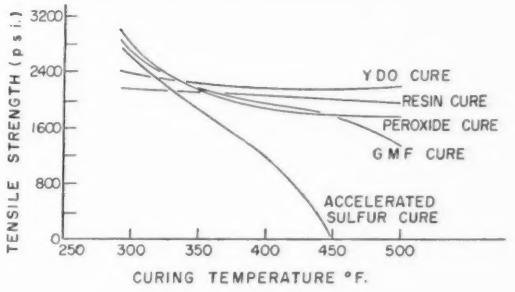


Fig. 7. Effect of type of curing system on the tensile strength of *Hevea* carcass Series 4 compounds

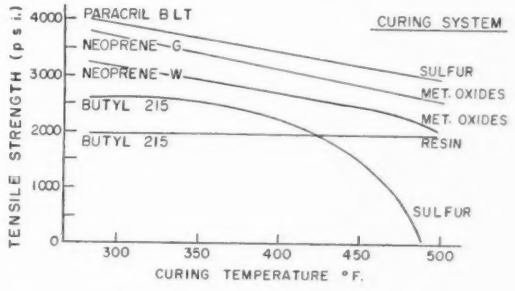


Fig. 8. Effect of curing temperature on tensile strength of Series 6 and 7 tread compounds made from several different polymers

patent No. 2,701,895. YDO is 2,2′-methylene-bis-(4-chloro-6-methylolphenol), and this curing agent is considered to be an improvement on the stannous chloride-activated resole resin curing combination since YDO contains its own built-in chlorine activator.

It should be noted that these compounds were not adjusted to either equal modulus or equal hardness. It would be possible to so adjust all except the sulfur-cured compound which reverts.

Sulfur-Bearing Accelerators in *Hevea* Rubber—Series 5

The Series 4 tests showed the previously noted instability of natural rubber at high temperatures of vulcanization to be related to the use of the sulfur curing system. Just what the role of sulfur might be in deterioration of physical properties during high temperature curing is not known, however. A comparison of sulfur cure with sulfur-bearing accelerators was

[13] "The Chemistry and Technology of Rubber," C. C. Davis and J. T. Blake, p. 429. Reinhold Publishing Corp., New York (1937).

TABLE 9. PHYSICAL PROPERTIES, SERIES 5 COMPOUNDS

Acceleration	MBTS plus Sulfur			Accelerators Only		
	Stress at 300%, psi.	Tensile, psi.	% Elongation at Break	Stress at 300%, psi.	Tensile, psi.	% Elongation at Break
Press cured at 292° F., min.						
45	1590	3700	550	1800	3410	480
90	1390	3240	530	1860	3280	450
Press cured at 400° F., min.						
2	710	1880	530	1400	2580	450
4	590	1580	550	1250	2680	450
Press cured at 500° F., min.						
½		degraded		770	1480	450
1		degraded		600	1190	450

TABLE 10. BUTYL, NITRILE, NEOPRENE RUBBER COMPOUNDS, SERIES 6

Compound	Butyl 13	Butyl 14	Nitrile 15	Neoprene 16
Enjay Butyl 215	100.00	100.00	—	—
Paracril BLT*	—	—	100.00	—
Neoprene W†	—	—	—	100.00
MPC Black‡	50.00	50.00	50.00	40.00
Resole resin§	¶9.00	—	—	—
Stannous chloride dihydrate	1.50	—	—	—
YDO	—	‖5.00	—	—
Circo light oil	—	3.75	5.00	5.00
Laurex	—	1.25	—	—
Zinc oxide	—	—	5.00	4.00
XLC magnesium oxide	—	—	—	3.00
MBTS	—	—	0.70	—
Monex**	—	—	0.25	—
Sulfur	—	—	1.50	0.75

* Medium nitrile content rubber, Naugatuck Chemical Division.
† General-purpose neoprene, Du Pont elastomer chemicals department.
‡ Spheron 6, Godfrey L. Cabot, Inc., Boston, Mass.
§ Super Beckacite 1001, t-butyl phenyl resole resin, Rohm & Haas.
¶ One part of resin added to polymer and black as a promoter during hot processing in Banbury.
‖ One part of YDO added to polymer and black as with ¶ above.
** Tetramethyl thiuram monosulfide, Naugatuck Chemical.

made to throw some light on this subject.

The sulfur-cured carcass compound of Series 4 was compared under Series 4 test conditions with a similar compound containing sulfur-bearing accelerators, but no elemental sulfur. The essential features of these Series 5 compounds are given below:

Compound No.	11	12
Sulfur	3.0	—
MBTS	0.50	—
Dibutyl xanthogen disulfide	—	3.0
Zinc dibutyl dithiocarbamate	—	3.0

The results obtained are shown in Table 9. At the higher curing temperatures the combination of sulfur-bearing accelerators produced a relatively stable system compared to the control cured with elemental sulfur and MBTS. It is suggested that elemental sulfur may promote deterioration of *Hevea* rubber at the elevated curing temperatures.

Butyl, Neoprene, and Nitrile Rubbers—Series 6

The tests run in Series 6 were aimed at evaluating the response of elastomers other than *Hevea* and SBR to the higher curing temperatures. The recipes used are given in Table 10, and the curing conditions and physical test results in Table 11.

The data in Table 11 indicate that both resin-cured and YDO-cured butyl rubber have relatively flat curing characteristics over the range of temperatures studied (292-500° F.). Nitrile rubber (Paracril BLT) cured with sulfur shows the same good stability to high curing temperatures found in SBR compounds, but with inherently higher tensile properties. Neoprene W in this test showed a lack of stability to high-temperature curing as evidenced by the low values for elongation at break in the samples cured above 350° F.

Further Neoprene and Butyl HTV—Series 7

Further work was done with butyl tread compounds using both resin and sulfur-type cures and with a neoprene tread compound cured with metal oxides. The recipes used are given in Table 12, and the curing conditions and physical test results in Table 13.

The physical test results indicate that the resin-cured butyl rubber is quite stable under HTV conditions; while the sulfur-cured butyl rubber is reverted badly at temperatures in excess of 400° F. Neoprene GRT, cured with metal oxides, is shown to be unstable at the highest curing temperatures.

Figure 8 shows the effect of curing temperature on the average tensile properties of the elastomers evaluated in Series 6 and 7.

Summary and Conclusions

Within the range of curing temperatures studied (292-500° F.), an increase in the vulcanization temperature exerted a deleterious effect in one way or another on the sulfur-cured vulcanizates of all of the elastomers studied. The effect is most marked above 370° F. for sulfur-cured *Hevea* and butyl rubbers. The magnitude of the effect varies for each elastomer,

TABLE 11. SERIES 6 CURING DATA

Cure, °F.	Elastomer Curing Agent: Time, Min.	Butyl Resin	Butyl YDO	Nitrile Sulfur	Neoprene Metallic Oxide
		Average Tensile, psi.—Elongation, % Unaged			
292	45, 90	2075–615	1635–490	4000–550	2440–480
350	4, 8	1870–615	1540–520	3350–580	2850–460
400	2, 4	2100–560	1920–455	3600–595	2630–260
450	1, 2	2150–545	1890–420	3060–520	2440–235
500	½, 1	1825–460	2025–420	2925–500	1985–200

however, and can be inhibited or largely prevented by choosing the proper curing system for elastomers such as *Hevea* and butyl rubbers which otherwise revert at the higher temperatures.

The synthetic rubbers, SBR and NBR, show significantly superior stability compared to *Hevea* rubber at elevated curing temperatures. In the tests reported in this paper, neoprene showed marked instability, but was more stable than sulfur-cured *Hevea* rubber at higher than normal curing temperatures.

Butyl rubber vulcanizates cured with stannous chloride-activated resole resins or with YDO [2,2′-methylene-bis-(4-chloro-6 methylolphenol)] show flat curing characteristics up to 500° F. Sulfur-cured butyl rubber, however, is shown to revert badly in the range 400-500° F.

These tests illustrate that the selection of the proper curing system extends the curing range of *Hevea* and butyl rubbers. Resin curing systems and YDO are quite effective with these elastomers and may be applicable to all elastomers. The peroxide-type cure and the GMF cure may also be applicable in commercial applications.

A continuation of the trend to automation and higher curing temperatures seems indicated in the rubber industry. The results reported herein suggest that compounders should carefully examine their choice of elastomer and curing system for high-temperature curing applications in order to provide stable compounds for factory production.

In sulfur-cured products SBR may be chosen because of its relative stability in high-temperature curing. On the other hand, resin-cured or YDO-cured butyl rubber may be preferred for many rubber products because such compounds may be cured with extremely short press cycles at 500° F.

One of the admitted deficiencies of butyl rubber is its relatively low thermal diffusivity (0.0053-0.0083)[11] resulting in decidedly longer curing times for products such as tires (35-40 minutes at 307° F. recommended).[14] It is suggested that butyl rubber tires cured with resin or YDO might be processed at much higher temperatures of vulcanization than is now possible with sulfur-cured tires.

The relative stability of NBR is of interest where high-temperature curing is desired for increased productivity in oil-resistant-type products in the industrial rubber goods plant.

Lastly, it has been demonstrated that natural rubber may be quite useful for certain high-temperature curing applications provided adequate stability is built into the compound by selection of the proper curing system.

[14] "Enjay Butyl for Tires," Enjay Co., Inc., p. 21 (1957).

TABLE 12. BUTYL AND NEOPRENE COMPOUNDS, SERIES 7

Compounds No.	17 Butyl Tread	18 Butyl Tread	19 Neoprene Tread
Curing Agent	Sulfur	Resin	Metallic Oxides
Enjay Butyl 215	100	100	—
Neoprene GRT*	—	—	100
MPC Black	50	50	—
HAF Black	—	—	27.5
Petroleum oil	5	5	—
Zinc oxide	3	—	5
XLC magnesium oxide	—	—	4
Circo light process oil	—	—	7
Microcrystalline wax	—	—	3
MBTS	1	—	.38
TUEX†	1.25	—	—
Resole resin‡	—	8.0	—
Stearic acid	1	—	—
Sulfur	.75	—	—
BLE-25	1	—	1.0
Flexamine	1	—	—
Stannous chloride dihydrate	—	1.6	—

* Sulfur modified neoprene, Du Pont.
† Tetramethyl thiuram disulfide, Naugatuck Chemical.
‡ Amberol ST 137.

TABLE 13. SERIES 7, CURING DATA

Cure, °F.	Time, Min.	Elastomer Curing Agent: Butyl Sulfur	Butyl Resin	Neoprene Metallic Oxides
		Average Tensile, psi.—Average Elongation, % Unaged		
292	45, 90	2595–685	1695–675	3730–650
400	4, 8	2330–765	1480–625	3270–535
500	2, 4	70–800+	1465–555	2630–415
500	6, 10	degraded	1420–640	2040–270

Effects of Brominated Butyl In Butyl Rubber Compounds

Factors affecting compounding and curing of butyl-brominated butyl rubber blends, and resultant vulcanizate properties evaluated

By A. C. BLUESTEIN and R. F. GROSSMAN
Anaconda Wire & Cable Co., Marion, Ind.

THERE has been considerable recent interest in the modification of butyl rubber through the introduction of polar groups into the polymer. Inertness, derived from its low unsaturation, lends butyl rubber its many excellent properties, but it is also responsible for some of its limitations. Modification of the properties of its compounds could be more readily achieved if a greater number of reactive sites were present, or could be incorporated, in the polymer. An example of the latter approach is the addition of bromine to butyl rubber to yield the elastomer known generally as "brominated butyl."[1] It is the purpose of this study to investigate several of the factors influencing the compounding of brominated butyl, particularly in blends with butyl rubber, toward technically useful ends.

Brominated butyl is capable of simultaneous cure through two distinct mechanisms: the action of sulfur upon ethylenic linkages still present after bromination, and carbon-carbon bonding induced through debromination by metallic oxides, particularly in the case of bromine present in the reactive allylic position. In blends of brominated butyl with butyl rubber, it would be of interest to know whether the latter mechanism is significant at any dilution of the brominated butyl, and, if not, at what level it becomes important.

Metal bromides are known to be reaction products of the metallic oxide cure mechanism; their presence may be expected to affect the thermal stability, electrical properties, and moisture absorption characteristics of brominated butyl vulcanizates. In order to investigate the effects of these variables, as well as differences in rate of cure and in physical properties, a series of compounds was prepared, using mixtures of butyl and brominated butyl rubbers as the base polymer.

Physical Properties

Compounding formulas are listed in Table 1; physical properties, determined according to ASTM Standard D 412-51T,[2] of the corresponding compounds, in Table 2. The first comparison made, (A) *versus* (B), illustrates the effect of replacing one-fourth of the butyl polymer in a typical mineral-filled sulfur-cured stock with brominated butyl. If both cure mechanisms are significant in such a blend, a more tightly cross-linked product would be anticipated. The observation of some degree of increased 200% modulus, when compound (B) is compared with (A), agrees with this hypothesis. Tensile strength and ultimate elongation are slightly lowered, and the rate of cure is relatively unaffected. The latter observation is unexpected, as

[1] Hycar 2202, B. F. Goodrich Chemical Co., Cleveland 15, O.
[2] American Society for Testing Materials, Philadelphia 3, Pa.

TABLE 1. COMPOUNDING FORMULAS

Compounds	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Enjay Butyl 035*	100	75	75	75	75	75	75	75	75	75	85	95
Hycar 2202	—	25	25	25	25	25	25	25	25	25	15	5
Whiting†	110	110	110	110	110	110	110	110	110	110	110	110
FT Black	5	5	5	5	5	5	5	5	5	5	5	5
Paraffin	5	5	5	5	5	5	5	5	5	5	5	5
Sulfur	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
Tellurac‡	1	1	1	1	1	1	1	1	1	1	1	1
Zinc oxide	13	13	5	—	—	—	—	—	5	—	—	—
Red lead, Pb_3O_4	—	—	—	5	7	12	15	—	—	7	7	7
Lead silicate, $PbSiO_3$	—	—	—	—	—	—	—	7	4	7	—	—

* Enjay Co., Inc., New York 19, N. Y.
† Atomite, Thompson, Weinman & Co., New York 17.
‡ Tellurium diethyldithiocarbamate, R. T. Vanderbilt Co., New York.

TABLE 2. PHYSICAL PROPERTIES

	Cure 310° F., Min.	Compounds (A)	(B)	(C)	(D)	(E)	(F)	(H)	(I)	(J)	(K)	(L)
Tensile strength, psi.	10	1290	1140	*	*	*	*	860	1090	*	*	*
	20	1410	1200	1270	*	1020	760	1090	1290	*	*	*
	30	1500	1410	1340	*	1110	870	1110	1330	930	850	820
	40	1340	1280	1270	900	1070	960	1040	1350	970	890	910
	50	—	—	—	870	980	1030	—	1190	990	990	960
Elongation, %	10	760	710	*	*	*	*	720	740	**	*	*
	20	720	690	720	*	710	710	720	720	*	*	*
	30	690	680	700	*	680	700	720	700	720	750	750
	40	660	670	670	750	670	690	700	700	700	730	740
	50	—	—	—	680	650	670	—	630	680	710	710
200% modulus, psi.	10	190	240	*	*	*	*	210	240	*	*	*
	20	230	250	240	*	290	190	210	250	*	*	*
	30	260	280	260	*	290	230	220	260	210	190	150
	40	250	310	280	210	300	270	260	280	220	200	170
	50	—	—	—	230	290	270	—	330	260	250	210

* Undercured.

TABLE 3. MOISTURE ABSORPTION CHARACTERISTICS

	Days	Compounds (A)	(B)	(C)	(E)	(F)	(H)	(I)	(K)	(L)
Mgs/in² water absorbed @ 70° C.	7	6.3	20.5	20.5	13.0	14.9	15.2	17.9	10.3	7.3
	14	8.3	22.9	22.8	14.2	14.6	15.2	19.4	12.6	9.2
	28	11.7	40.0	38.2	19.2	21.7	27.3	38.4	21.2	15.1

the premise of two independent cure mechanisms suggests the possibility of a marked increase in rate of cure.

Compound (C) illustrates the effect of significantly lowering the metal oxide concentration in a butyl-brominated butyl rubber blend. Retarded rate of cure, lowered optimum tensile strength and some degree of lowering of the 200% modulus are observed when (C) is compared with (B). It is apparent that to achieve optimum properties in such a blend both cure mechanisms must be fully utilized.

In compounds (D) through (G), zinc oxide is replaced by red lead, in progressively larger amounts. The concentration of this oxide is apparently extremely critical; inclusion of an insufficient quantity, as in compound (D), or of too much, as in (F), results in severe cure retardation. In the latter case, compounds prepared with concentrations of red lead higher than 12 phr. (G) failed to attain a useful state of cure; rationalizations accounting for this effect are not at all evident. At an optimum loading of red lead, as in compound (E), low extension modulus and ultimate elongation are comparable to (B); tensile strength, however, is noticeably lowered. Substitution of an equal quantity of lead silicate for the red lead, as in (H), leads to a lowering of modulus and increase in elongation. These properties, modulus and elongation, can be returned to a level comparable with the control, (A), by replacement of some of the lead silicate with zinc oxide, as in (I). Combination of lead silicate and red lead, as in (J), tends to produce serious cure retardation, similar to the effects noted with an overloading of red lead.

When the concentration of brominated butyl is reduced to a level much below one-fourth of the polymer, as in compounds (K) and (L), rate of cure is markedly lowered, and compounds of low tensile strength and 200% modulus result. In these cases, the high dilution of brominated sites in the polymer may cause the metal oxide mechanism to become relatively ineffective, leading to a poor overall state of cure.

Moisture Absorption Characteristics

The moisture absorption characteristics of the above compounds, determined according to ASTM Standard D 470-52T, are listed in Table 3. The formation of highly water soluble zinc bromide from the metal oxide cure mechanism, as in (B) and (C), is seen to increase drastically the quantities of water absorbed by the sample. Substitution of red lead for zinc oxide (E and F), involving formation of sparingly soluble lead dibromide during cure, increases the resistance to moisture absorption, as does lead silicate (H). In neither case, however, is the equivalent of pure butyl rubber reached. This factor, taken with the failure of the moisture absorption to level off with time, is the primary one mitigating against the use of brominated butyl in formulations where electrical stability is required.

The intermediate moisture absorption values obtained



Richard F. Grossman



Allen C. Bluestein

The Authors

Allen C. Bluestein, head development chemist, rubber and plastics research and development laboratory, Anaconda Wire & Cable Co., Marion, Ind., received his B.S. in chemistry from the University of Massachusetts in 1949. He has studied also at Boston University, Massachusetts Institute of Technology, and Northeastern University.

Mr. Bluestein was employed by General Electric Co. in materials and process research and development from 1949 until 1955, during which time he was concerned with electrical insulations, particularly those made from butyl rubber. He has been with Anaconda since 1955, where he has obviously continued work with butyl rubber as well as in the fields of ozone resistance and cross-linked polyethylene.

This author is a member of the American Chemical Society and its Division of Rubber Chemistry and of the Fort Wayne Rubber & Plastics Group, of which he is president-elect.

Richard F. Grossman, research chemist, Anaconda Wire & Cable Co., received his B.A. degree from Cornell University in 1955, his M.A. from Harvard University in 1956, and is working on his Ph.D. at Purdue University.

He has been employed at Anaconda in the rubber and plastics laboratory since 1957, where he has been concerned with the chemistry of polymer degradation under various conditions and new methods of cross-linking polymers.

Mr. Grossman also is a member of the ACS and its Division of Rubber Chemistry and the Fort Wayne Rubber & Plastics Group.

with higher dilution of the brominated polymer, as in (K) and (L), indicate that the increase in water absorption is a function of the fraction of brominated butyl in the compound. It is, therefore, unlikely that such blends could be compounded for both optimum tensile strength and resistance to moisture absorption, as the first property is directly, and the second property, inversely, related to the fraction of brominated butyl.

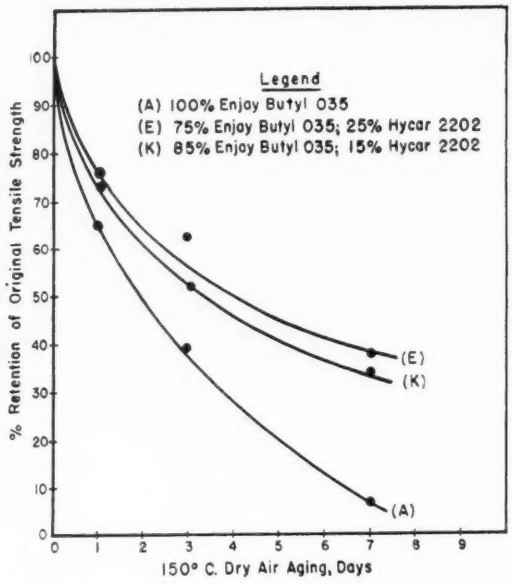


Fig. 1. Aging characteristics at 150° C. (302° F.) of butyl and butyl-brominated butyl rubber blends. Retention of tensile strength

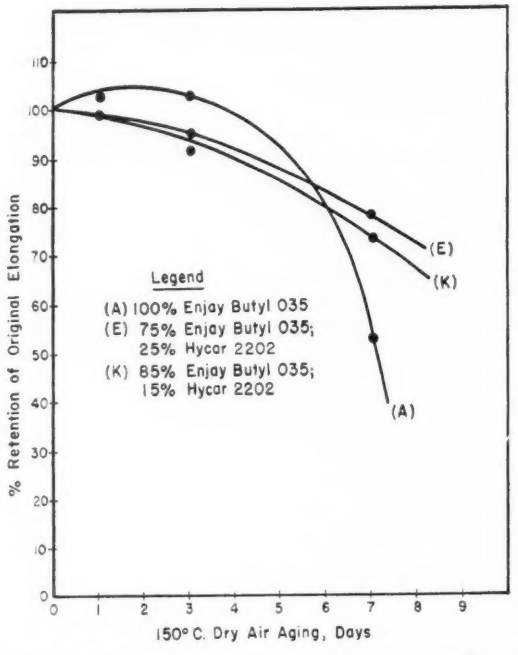


Fig. 2. Aging characteristics at 150° C. (302° F.) of butyl and butyl-brominated butyl rubber blends. Retention of ultimate elongation

Electrical Properties

Initial electrical properties of several representative compounds were determined according to ASTM Standards D 149-55T and D 150-54T, and listed as Table 4. It can be concluded that blends of butyl and brominated butyl have, at least initially, electrical properties essentially equivalent to those of butyl rubber.



Fig. 3. Effect on samples of butyl rubber and butyl-brominated butyl rubber blends after air aging 7 days at 150° C. (302° F.). *Left to right:* A, 100% butyl rubber; K, 85% butyl, 15% brominated butyl rubber; E, 75% butyl rubber, 25% brominated butyl rubber; A, 100% butyl rubber, unaged

TABLE 4. ELECTRICAL PROPERTIES

Compounds	(A)	(E)	(H)
1000-Cycle standard inductive capacitance	4.03	3.88	4.05
% power factor	0.32	0.32	2.10
Dielectric strength, volts/mil*	816	879	806

* Rapid rise, 1000 V/sec. 0.075-inch sheets.

TABLE 5. HIGH-TEMPERATURE BROMINATED BUTYL COMPOUNDS

Compounds	(M)	(N)	(O)	(P)
Enjay Butyl 035	90	—	100	—
Hycar 2202	10	100	—	100
Whiting	130	130	130	130
Paraffin	3	3	3	3
Stearic acid	2	2	2	2
Zinc oxide	10	10	5	—
Red lead	—	—	10	12
Amberol ST-137*	15	15	—	—
Sulfur	—	—	1	1
GMF†	—	—	3	3
Optimum cure, 310° F.	90′		40′	40′
365° F.		10′		
Tensile strength, psi.	800	500	900	500
% Elongation	750	570	700	320

* Modified phenolic resin, Rohm & Haas, Philadelphia, Pa.
† p-Quinonedioxime, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

Aging Properties

The % retention of initial tensile strength and ultimate elongation of compounds (E), containing 25% brominated butyl, (K), containing 15% brominated butyl, and (A), pure Enjay Butyl 035, when subjected to severe heat aging in dry air at 150° C (302° F.), are plotted in Figures 1 and 2. It can be seen that, under these drastic conditions, incorporation of brominated butyl markedly improves resistance to aging of sulfur-cured butyl rubber. In addition, softening and creep

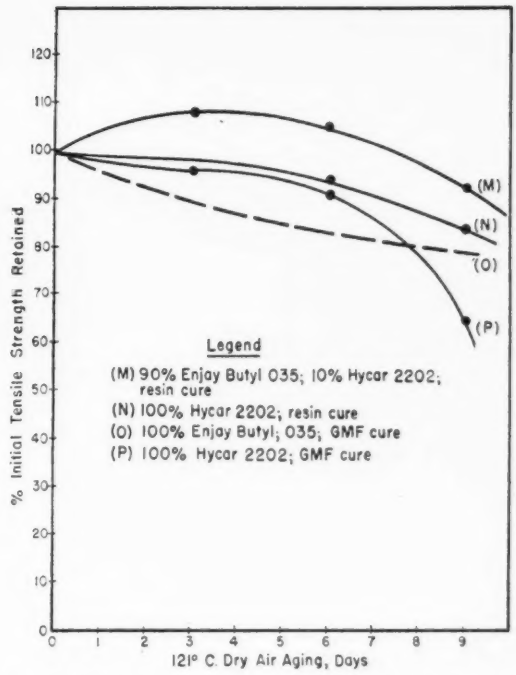


Fig. 4. Aging characteristics at 121° C. (250° F.) of butyl and butyl-brominated butyl rubber blends. Retention of tensile strength

due to thermal reversion are noticeably reduced, as shown in Figure 3. It can be concluded that blends of butyl and brominated butyl, compounded to yield physical properties equivalent to pure butyl, will, in general, possess improved resistance to aging.

It was felt that similar improvements in aging resistance could be realized in other cure systems for butyl rubber. To that end, compounds (M) through (P), as described in Table 5, were prepared. Compounds (M) and (N) contain the resin cure system, known to lend excellent resistance to heat aging to butyl compounds.[3] Compounds (O) and (P) employ the quinoid-type cure; compound (O) serves as a control.

Thermal stability, as measured by retention of initial tensile strength and ultimate elongation during aging, this time at 121° C. (250° F.), of these compounds is described in Figures 4 and 5. The temperature of 121° C. is the maximum at which these compounds are expected to perform. Under these conditions, compound (M), containing 10% brominated butyl and a resin cure system, apparently reverts slowly, although remaining more or less serviceable. The effect of the metal oxide cure mechanism is probably insignificant at this dilution of brominated butyl rubber. Compound (N), pure brominated butyl, derives cure from both the resin and metal oxide systems and retains tensile strength and elongation well during 121° C. aging. It is felt that resin cured brominated butyl and blends of the latter with butyl rubber, when properly compounded, should be useful for service at temperatures up to 120° C. (248° F.).

[3] C. S. Buettner, C. R. McGill, *Product Eng.*, 28, 19, 90 (1957).

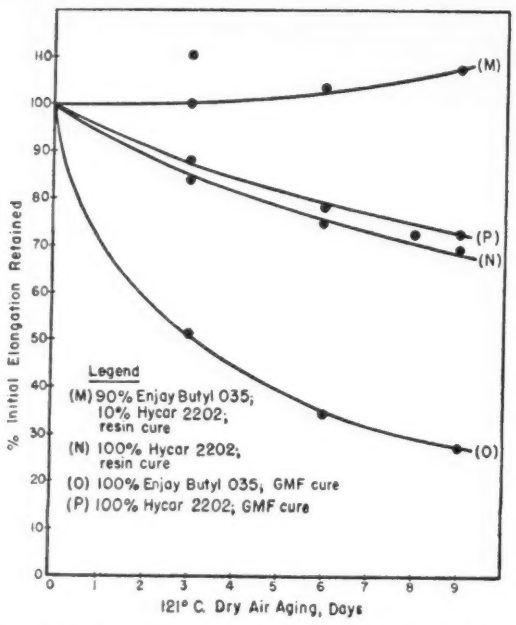


Fig. 5. Aging characteristics at 121° C. (250° F.) of butyl and butyl-brominated butyl rubber blends. Retention of ultimate elongation

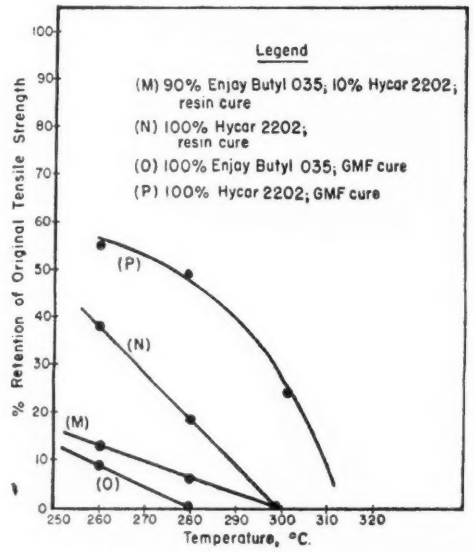
Compound (O) illustrates the behavior of a typical mineral-filled butyl rubber stock with which the quinoid-type cure was employed, when subjected to severe heat aging. Tensile strength is retained well, but elongation drops rapidly to an unsatisfactory level, leading to a brittle, inelastic product. When butyl rubber is replaced by brominated butyl, as in compound (P), elongation is satisfactorily retained during 121° C. aging. Tensile strength is at first relatively unaffected, then drops sharply. Brominated butyl rubber and blends with butyl rubber, with which the quinoid-type cure is used, should probably be useful for intermittent service at temperature up to 120° C.

Destruction temperatures for this series of compounds were determined by 15-minute high-temperature aging, plotted as the retention of initial tensile strength *versus* temperature, in Figure 6. Destruction temperatures for all of these compounds lie in the 280 to 320° C. range. The most noticeable improvement was observed in the cases of compounds (N) and (P), where complete replacement of butyl rubber by brominated butyl rubber leads to much higher retention of tensile strength at these high temperatures. Compound (P), in particular, should remain serviceable after brief exposure to temperatures as high as 250 to 300° C. (482 to 572° F.).

Summary and Conclusions

Several of the variables affecting the compounding of blends of butyl and brominated butyl rubber have been investigated. Incorporation of about 25% brominated butyl is required to take full effect of the metal oxide cure mechanism; lower fractions of brominated

Fig. 6. Effects of 15-minute aging at various elevated temperatures on butyl and butyl-brominated butyl rubber blends. Retention of tensile strength for various types of cure systems



butyl lead to cure retardation and lowered physical properties. A metal oxide capable of forming a relatively insoluble bromide, such as red lead, should be employed wherever maximum resistance to moisture absorption is desired. Blends of butyl and brominated butyl may be readily compounded to yield stocks of heat aging resistance superior to comparable pure butyl compounds employing the sulfur cure. Similar improvements are possible with compounds containing resin and quinoid-type cure systems.

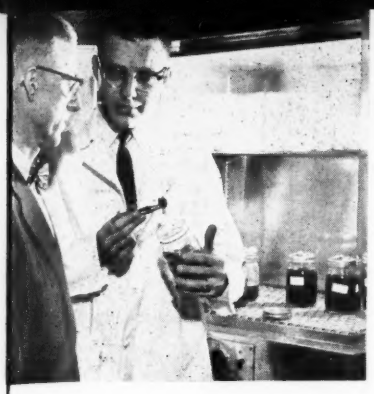
Acknowledgment

The authors wish to thank John Young and Russell D. Roland for conducting much of the experimental testing.

●

Conductive Flooring Proved Serviceable

Conductive flooring is as serviceable as non-conductive flooring of the same type, at the same time reducing the hazards of explosion, according to a recent report of a National Bureau of Standards investigation sponsored by the Army, Navy, and Air Force jointly. The Bureau also found in this investigation that current methods used for measuring the resistance of installed conductive floors reasonably simulate the conditions these floors meet in actual service. Although the flooring was investigated primarily for use in hospitals, many of the results that were obtained would apply to hazardous locations also.



Test Rubber Compounds For Food Handling Service

B. F. Goodrich finds that meeting severe requirements of the 1958 Food Additives Amendment is a job for special group

Fig. 1. Wm. E. McCormick (left), manager of industrial hygiene and toxicology, B. F. Goodrich, watches Robert W. Modrell, food evaluation chemist, preparing test broth containing rubber sample for the extraction test

RUBBER is not normally eaten, except perhaps in chewing gum, but the effective date of the 1958 amendment to the Federal Food, Drug & Cosmetics Act, March 6, 1960, has prompted at least one major rubber company to set up a special chemical laboratory to determine any materials used in the manufacture of rubber products that might extract or migrate into food. When one considers the many possible times that food items might come into contact with a rubber container, hose, conveyor belt, seal, coated tank, or other rubber item, it is very apparent that the industry concern over the law and its implications is quite justified.

Problems of Manufacturer

A major problem for the rubber product manufacturer is to decide, first of all, which of his products might contain materials that would migrate, what the migrating material is, whether the migrating material is harmful to humans, and in what quantity is the migrating material harmful. On the basis of these determinations, the manufacturer himself then decides to continue manufacture, to substitute materials or to discontinue manufacture.

If in doubt, he may send his data to the Federal Food & Drug Administration for an opinion. The FDA will not grant an approval under the amendment, but will render an opinion based upon the complete test results and information furnished by the manufacturer. It is the sole responsibility of the manufacturer, therefore, to obtain information on his products and to make the decision to sell or not to sell.

In order to obtain this extraction data a manufacturer may send his products to an independent laboratory, or he may set up his own test facilities. The B. F. Goodrich Co. elected, about a year ago, to do the latter and set up a special group within the company's existing department of industrial hygiene and toxicology.

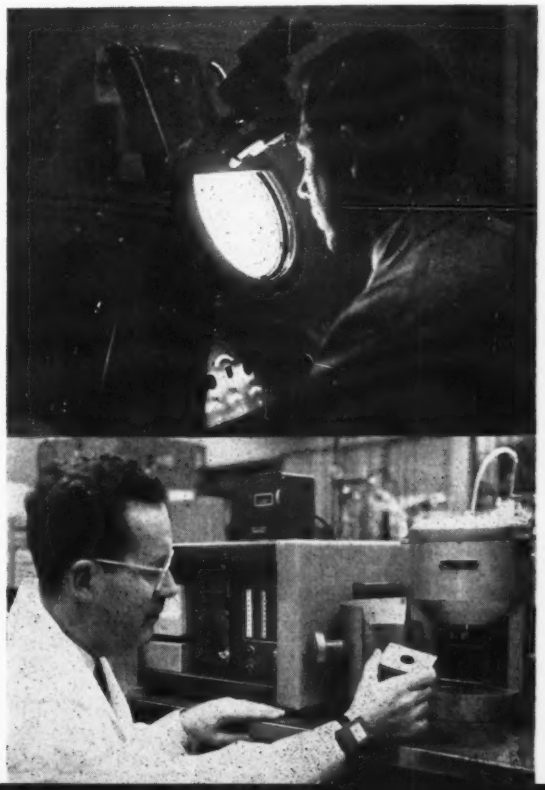
Fig. 3. John W. Born, specialist in radiotracer chemistry, prepares to place sample of food handling rubber compound in laboratory Geiger counter to measure radioactivity prior to the extraction test

Making rubber products that are safe to use for food handling is not something which is just developing, but has been going on for many years. The significant point of the new investigations is that now the company is seeking definite proofs of the products' suitability. Goodrich has found that products developed over the years through close work with the FDA and the United States Department of Agriculture have proved to be suitable for food handling in the new program.

Another major stumbling block in setting up the program was, and still is, the lack of well-defined methods for making these extractions. It was only recently that the industry through The Rubber Manufacturers Association, Inc., and the FDA announced plans for a technical committee to work on test methods and try to make them consistent and workable while at the same time not too expensive.

(*Continued on page 164*)

Fig. 2. Electron Microscopist Ronald W. Smith using the electron microscope to examine extracted crystals at 100,000 magnifications in the illuminated screen



MEETINGS and REPORTS

Invited Papers, Goodyear Lecture at Buffalo Meeting

The spring meeting of the Division of Rubber Chemistry of the American Chemical Society will be held separate from the parent Society in Buffalo, N. Y., on May 4, 5, and 6. The headquarters hotel will be the Statler Hilton.

Special features of this meeting will be invited papers by Prof. Peter J. Debye, retired, a Nobel prize winner in chemistry of Cornell University, and by Prof. Herman Mark, retired, an international authority on polymer chemistry of Brooklyn Polytechnic Institute, and the 1960 Charles Goodyear Medal Award Lecture by Dr. W. B. Wiegand, retired, and former vice president of Columbian Carbon Co.

The first of the four technical sessions will begin at 2:00 p.m. on Wednesday afternoon, May 4, with Division Chairman W. J. Sparks, Esso Research & Engineering Co., presiding. Dr. Sparks will introduce Professor Mark, who will present his paper on "Latest Advances and Break-Throughs in the Chemistry of Polymers and Polymerization," as the first paper of this session. Dr. Sparks will also introduce Professor Debye at the beginning of the technical session on Friday morning, May 6, who will give his paper on "Latest Advances and Break-Throughs in the Physics of Polymers," at that time. Dr. Wiegand's Goodyear Lecture entitled, "Determinants in Research," will be delivered at 11:10 a.m., Thursday morning, May 5. The medal, scroll, and honorarium will be presented to Dr. Wiegand by Dr. Sparks at the Division banquet on the evening of May 5. John N. Street, Firestone Tire & Rubber Co., will be Dr. Wiegand's biographer.

The morning of May 4 will be given over to registration, and members of the Division's 25-Year Club will assemble for their luncheon-meeting at 11:30 a.m., with John M. Ball, Midwest Rubber Reclaiming Co., presiding.

There will be a Suppliers' Cocktail Party beginning at 6:00 p.m. on May 5, preceding the banquet at 7:30 p.m. C. H. Peterson, U. S. Rubber Reclaiming Co., is chairman for the cocktail party. The ladies are invited to this party and banquet, which latter event will include entertainment following the Goodyear Medal Award presentation.

L. J. Halpin, Dunlop Tire & Rubber Corp., is chairman of the local committee on arrangements for the Buffalo meeting and reports that a special program has been arranged for the ladies which will include tours of the historic Niagara Frontier and many nationally famous landmarks of the area. There will be a hospitality room open every day at the Statler Hilton for the ladies attending the meeting.

Some additional details concerning the Buffalo meeting were included in the letters to the members of the Division from the secretary, R. H. Gerke, United States Rubber Co., and from the chairman of the local committee on arrangements, Mr. Halpin.

Dr. Gerke has also pointed out that the deadline for abstracts of papers for the September, 1960, meeting of the Division is June 3, 1960.

Program and Abstracts of Papers
Wednesday Morning—May 4

9:00 a.m. Registration.

11:30 a.m. 25-Year Club Luncheon. J. M. Ball, presiding.

Wednesday Afternoon—May 4
W. J. Sparks, Presiding

2:00 p.m.—1. Opening Remarks and Introduction of Prof. Herman F. Mark. W. J. Sparks, Division chairman.

2:10 p.m.—2. Invited Paper. Latest Advances and Break-Throughs in the Chemistry and Polymers of Polymerization. Herman F. Mark, Brooklyn Polytechnic Institute, Brooklyn, N. Y.

3:10 p.m. — 3. Low-Temperature Rheology of Silicone Elastomers. P. D. Braun, Silicones Division, Union Carbide Corp., Tonawanda, N. Y.

In order to extend the knowledge of the low-temperature behavior of silicone elastomers, the previously unexplored interrelation of exposure time and temperature was investigated, with emphasis on the effects of prolonged exposures. In addition, the effect of polymer architecture, known to govern the area of low-temperature utility of these elastomers, was studied in conjunction with the exposure time-temperature variables. Several representative types of silicone polymers were investigated, including conventional dimethyl siloxanes; polymers with polar, pendant groups; physical blends of these two; and siloxanes containing intra-polymer chain stiffeners.

This work shows that, although short-term exposure tests are useful for control and selection work, a more reliable indication of utility is derived from prolonged exposure tests over a range of low temperatures. Polymer crystallization can occur over a wide range, causing stiffening of the elastomer at temperatures well above those indicated by short-term exposure tests. Polymer structure determines the area of utility by governing temperature range in which crystallization can occur. The presence, in proper concentration, of bulky pendant groups or intra-polymer chain stiffeners, introduced by copolymerization, tends to lower this temperature range. Incorporation of the pendant groups by polymer blending is much less efficient in lowering the temperature range of crystallization.

This work affords further insight into the behavior of silicones at low temperatures and represents a valuable aid in the design of future low-temperature silicone polymers. In addition, it furnishes the design engineer with a reliable indication of the low-temperature capabilities of the various types of silicones, enabling him to select that material which best fits his needs.

3:30 p.m. — 4. Radiation-Induced Compression Set on Elastomeric Compounds. E. E. Mooney[1] and S. T. Semegen, B. F. Goodrich Research Center, Brecksville, O.

Gamma radiation damage on elastomeric compounds under compression has been studied, using compression set measurements. Irradiation was conducted in air and alkyl diphenyl ether at room temperature. All compound evaluations were made with and without potential radiation damage inhibitors (antirads).

CR (chloroprene rubber), NBR (nitrile-butadiene rubber), and SBR (styrene-butadiene rubber) were formulated as aircraft hose, seals, fuel cells, or wire insulation. Other elastomers were tested in standard tests recipes. The importance of equivalent cure is emphasized. Graphs of percentage compression set *versus* radiation dose are used for evaluation of radiation resistance. Compression set is satisfactorily computed, using a calculation

[1] Author's name in bold face indicates person delivering paper.

which adequately corrects for pre-irradiation set. Based on radiation dose required to effect 50% compression set (at room temperature in air) the order of radiation resistance of control elastomeric compounds investigated is:

SBR> NBR> NR> CR> Hypalon 20> Hycar 4021> Viton A> Thiokol ST> Thiokol FA.

These compounds (with or without antirads) are rated on the basis of the highest dose required for 50% compression set, as follows:

NBR> Hycar 4021> SBR> CR> NR> Hypalon 20> Viton A> Thiokol ST> Thiokol FA.

An attempt has been made to develop an empirical mathematical relation which fits radiation compression set data.

3:50 p.m.—5. Oil Migration Study. Frank Kadlec and Ray Thoman, Gates Rubber Co., Denver, Colo.

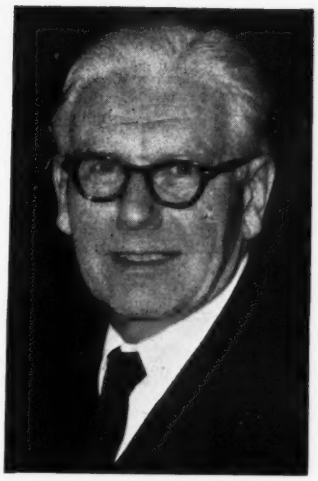
The purpose of this study was to establish that oils tend to migrate from oil-extended stocks into oil-free stocks or stocks containing a limited amount of oil, and to develop a method of measuring this oil migration.

Both objectives were accomplished. Data are presented showing the variation in oil present in stocks, as determined by acetone extracts. Photographs under ultraviolet light, an original method, visually confirm data obtained by use of acetone extract determinations. Data and photographs are presented of cured test samples after aging on the shelf, in a hot air oven, and up to 360 days on the roof. Also included are data on oil migration between two uncured stocks after shelf and heat aging. It is shown that the tendency of oil to migrate from a given stock is reduced when even a small amount of oil is present in the other component stock.

Further work presently under way, such as the effect of oil migration on adhesion, migration of curatives and aging inhibitors, and possible means of reducing or preventing oil migration, is outlined.

4:10 p.m.—6. Viscosity Control in Butyl Latex. Alfred L. Miller, Esso Research & Engineering Co., Linden, N. J.

The unusual chemical stability of Enjay Butyl Latex MD-600-55 makes possible the adjustment of its viscosity, increase or decrease, by a novel technique. By the appropriate addition of a wide variety of salts, the viscosity of Enjay Butyl Latex MD-600-55 can be more than doubled or reduced, to about one-fifth of the original value, as required, with only negligible dilution. By this means the viscosity of butyl latex can be drastically reduced before heat concentration to result in a latex of high solids (65-70%) with usefully low finished viscosity. The salt



Herman F. Mark

additives do not produce instability and do not interfere with cure. In the case of ammonium or amine salts, cure is actually improved.

This process does not appear to be concerned with particle coalescence but does depend upon the reactions of dissolved emulsifier. Data to support this view will be presented.

Thursday Morning—May 5
W. S. Coe, Presiding

9:00 a.m.—7. The Reaction of Dicumyl Peroxide with Dimethyloctadiene. Determination of the Cross-Linking Efficiency. C. R. Parks and O. Lorenz, Goodyear Tire & Rubber Co., Akron, O.

The cross-linking efficiency of dicumyl peroxide (DCP) was investigated, using 2,6-dimethyl-2,6-octadiene (DMOD) as a model olefin. One of the difficulties encountered in making cross-linking measurements on even simple systems such as the one above is to find an analytical method both rapid and reliable. Most chemical methods for analyzing the reaction products are laborious and inconsistent. High-temperature gas-phase chromatography offers a solution to some of the complex analytical problems encountered in this type of work. The amount of cross-linked product from the reaction of dicumyl peroxide with dimethyl octadiene could be followed readily by means of the chromatograph

It was found that the yield of cross-linked product approached 100% in the investigated temperature range of 120-150° C., which means that one cross-link has been formed for each molecule of peroxide decomposed. This phenomenon occurred, however, only when a molar ratio of DMOD:DCP = 20:1 or above was used. When larger amounts of peroxide were used, less than theoretical yields were found. The cross-linked product was found to be almost exclusively dimer (above a ratio of 20:1). Kinetic data were obtained to show that the cross-linking reaction followed a first-order law. The activation energy was found to be 32 kcal/mole.

9:30 a.m.—8. Studies in the Measurement of Unsaturation in Butyl Rubber. I. J. Gardner and S. B. Robison, Esso Research & Engineering.

The commercial importance of butyl rubber as a vulcanizable elastomer is resident in a minor concentration of isoprene in the polymer. Many techniques of analysis for this constituent have been examined. Unsaturation measurements by ozonolysis, which are based on the decrease in molecular weight of the polymer on exposure of a solution of the polymer to ozone, have afforded values which amount to about only 60% of the results obtained with chemical and isoprene carbon-14 labeling techniques. The possibility of the formation of polymeric ozonides contributing to this variance has been explored.

The effects are presented of a number of potential ozonide terminating agents on the limiting viscosity average molecular weight obtained on exposure to ozone. Particular attention is given to mercaptans and the effects of their structure. Experimental evidence to confirm the theory of ozonide termination by mercaptans, and the effects of the reaction variables of time, temperature, and solvent, are discussed.

10 a.m.—9. The Correlation of the Reactivity of Magnesium Oxide with Its Performance as a Processing and Curing Aid for Elastomers. Richard A. Patton, Morton Chemical Co., Woodstock, Ill.

The variation in performance of magnesium oxide as an elastomer processing and curing aid has plagued compounders for many years. These variations have been observed, not only between "equivalent" grades from different manufacturers, but also between different lots from the same manufacturer.

A study was undertaken to determine whether the performance characteristics of magnesium oxide in elastomers could be related to a readily measurable yardstick of oxide reactivity. It was found that the extent to which magnesium oxide chemisorbs iodine is a measure of the rate at which the oxide will react with the vulcanization decomposition products of elastomers such as neoprene, "Hypalon," "Viton," Fluorel, and chlorobutyl rubber. This relation is confirmed further by the excellent agreement between magnesium oxide iodine numbers and the Mooney scorch times for these elastomers, and it was found that rate and state of cure of the various elastomers correlate with this iodine absorption property of the magnesium oxide used. In connection with differences in the functions of various grades of magnesium oxide with

different elastomers, however, it was found, for example, that the highly reactive oxides provide maximum processing safety with the neoprenes and the least processing safety with "Hypalons."

While control of processing and curing these elastomers by use of the iodine numbers of the magnesium oxide cannot overcome variations in the elastomers themselves, the method can minimize the compounders' problems. Identification of the variability in magnesium oxide reactivity in elastomer compounding is a step in the direction of more scientific compounding and should be a worthwhile contribution to rubber technology.

10:20 a.m.—10. Effect of Amine Structure on Properties of Cured Polyurethanes. Arthur J. Sampson and C. F. Blaich, Jr., The Carwin Co., North Haven, Conn.

It is well known that amine curing agents impart outstanding properties to cured polyurethanes, and it has been found that such curing agents with inherent chemical rigidity will produce elastomers with very desirable characteristics.

In a recent program to determine the effect of amine structure on urethane properties, 3,3′-dichlorobenzidine, o-tolidine, dianisidine, methylene-bis-(o-chloroaniline), diaminodi-phenylsulfone, methylene-bis(4 phenylamine), and polymethylene polyphenylamine have been evaluated as potential curing agents for commercially available urethane polymers. These curatives have also been evaluated with prepolymers of known composition. The 3,3′-dichlorobenzidine (DCB) imparts extremely high modulus and good solvent resistance to urethanes, as well as extended pot life and reduced cure time.

The effect of cure conditions are discussed, with emphasis on the outstanding adaptability of DCB to plant operation. For applications in which automatic mixing equipment is available, and quick set time is desired, the use of methylene-bis(4 phenylamine (MDA), and polymethylene polyphenylamine (PAPA) is reviewed. It has been found that the polymeric structure of PA provides improved properties over other fast-curing amines such as MDA. Tolidine and dianisidine can also be used to obtain shorter set times, while the high-quality urethane properties inherent with the benzidine structure may still be obtained.

This paper should be of general interest since it discusses the relation of molecular structure of the curing agent to the properties of the cured urethane. Because of the recent interest in the possible carcenogenic activity of DCB, the health hazards of amines and American and Russian work are reviewed, and references are given.

11:00 a.m. Business Meeting. W. J. Sparks, Presiding.

11:10 a.m. Determinants in Research. W. B. Wiegand, 1960 Charles Goodyear Medalist.

Thursday Afternoon—May 5
E. H. Krismann, Presiding

2:00 p.m.—11. Factors Influencing the Ozone Resistance and Physical Properties of NBR Vulcanizates Modified with PVC Resins. W. A. Wilson, Goodyear.

Protection of NBR vulcanizates against ozone attack by modification with PVC resins has been previously reported. However, several variables in compounding and mixing techniques may have a direct influence on the degree of ozone resistance and the physical properties which can be obtained.

Adequate fluxing of the NBR/PVC blend is essential for optimum physical properties and ozone resistance. Fluxing temperatures vary with the average effective inherent viscosities of the PVC resins and the mode of mixing. Typical fluxing temperatures for various PVC resins with NBR polymers are listed. NBR polymers of low acrylonitrile content blended with PVC resin have poorer ozone resistance than NBR polymers containing higher acrylonitrile content. Lower molecular weight PVC resins, as indicated by inherent viscosities, also do not have so good ozone resistance as those of higher viscosities when blended with NBR polymers. Emphasis is also placed on the effects of pigmentation with various carbon blacks and light colored pigments, and various plasticizers.

Oil- and fuel-resistant compounds with excellent ozone resistance may be obtained by proper choice of an NBR polymer and PVC resin blend which has been adequately fluxed. Applications may include fuel hose jackets, cable jackets, shoe soling, and conveyor belt covers.

2:30 p.m.—12. Factors Affecting the Weather Resistance of "Hypalon" Chlorosulfonated Polyethylene.[2] P. A. Peffer, Jr., and R. R. Radcliff, E. I. du Pont de Nemours & Co., Inc., elastomer chemicals department, Wilmington, Del.

The outstanding weather resistance of "Hypalon" chlorosulfonated polyethylene vulcanizates is largely responsible for their use by the rubber industry in such applications as white sidewalls, garden hose, coated fabrics, and coated sponge, and by the paint industry in exterior maintenance paints. Because changes in "Hypalon" take place slowly during exposure, however, the relations between compounding variations and performance during aging have not been clearly defined. This paper will present an interpretation of data concerning these factors with the objectives of broadening compounding technology and forming a basis for further investigations in this field. The following topics are discussed:

1. A comparison of present "Hypalon" polymers is shown. Data indicate that stability decreases in the following order: "Hypalon" 40 > "Hypalon" 20 > "Hypalon" 30.
2. Pigments are shown to be essential ingredients in compounding for outdoor durability. Vulcanizates containing optimum amounts of stable, ultra-violet light absorbing white or color pigments approach those containing carbon black in durability. Pigment requirements are shown to be more critical as the thickness of the exposed specimen decreases because a larger percentage of the cross-sectional thickness is exposed to ultra-violet radiation.
3. Vulcanizates containing fillers, which are essentially transparent to ultra-violet light, show wide variations in chalk resistance. Whiting, a poor filler for most elastomers, imparts excellent chalk resistance to vulcanizates at relatively high concentrations; whereas clay chalks at concentrations as low as 20 volumes.
4. In compounds cured with magnesia, the concentration strongly influences the rate of change of stress-strain properties during exposure, but does not affect the rate of change in surface characteristics. Tri-basic lead maleate has an opposite effect in that its concentration shows a strong relation to changes in surface characteristics during exposure, but only slightly affects the rate of change of stress-strain properties. Quite unexpectedly, it was found that phenolic antioxidants minimize the changes which occur when the concentration of tri-basic lead maleate is varied.

2:50 p.m.—13. Lignite Tar Fractions as Antioxidants and Plasticizers for Rubber. R. A. Clark and W. J. Mueller, Battelle Memorial Institute, Columbus, O.

Studies were made to discover potential applications for lignite tar fractions in rubber. The materials investigated were produced from low-temperature lignite tar by dual solvent extraction (aqueous methanol and hexane) and distillation procedures.[3]

High boiling methanol solubles (HBMS), which consist predominantly of derivatives of phenol, were found to have antioxidant properties in rubber fully comparable to those of phenyl-beta-naphthylamine. Hexane soluble residue (HSR), which is both an effective antioxidant and a plasticizer, can be blended with HBMS to obtain an optimum balance of aged rubber physical properties. While the majority of the investigation was conducted with SBR-1500, studies also re-

[2] Contribution No. 167 of the Du Pont elastomers laboratory.
[3] *Ind. Eng. Chem.*, 52, 131 (1960).

vealed similar effects in natural rubber, NBR, and neoprene.

The investigation opens up a new class of raw materials for rubber compounding that are low in cost, available in limitless amounts, uniform in composition, and which can be tailored to give particular performance characteristics.

3:10 p.m.—14. A New, Safe-Processing, Fast-Curing Fluorocarbon Elastomer. D. L. Peterson and D. A. Stivers, Minnesota Mining & Mfg. Co., St. Paul, Minn.

One of the major problems during fabrication of fluorocarbon elastomers is processing safety, or if safety is obtained, development of a fast cure and the achievement of optimum heat resistance and compression set properties of the vulcanizates.

The vulcanization of copolymers of vinylidene fluoride and hexafluoropropylene with hexamethylene diamine carbamate (HMDA-C) is typical of this problem. When cured with HMDA-C, Fluorel KX-2141 vulcanizates possess the heat, fluid, and compression set properties of Fluorel Brand Elastomer; while uncured compounds have fast rates of press cure (10 to 20 minutes at 300 to 350° F.) and good safety against scorching during processing (MS 250° F., 17 to 30 minutes to 10-point rise).

This paper will describe physical properties and compound variations made with this new elastomer in the development of specification compounds and compounds for resistance to compression set and extended aging at high temperatures (400 to 700° F.).

3:30 p.m.—15. Zinc Oxide Quality Control with the Direct Reading Spectrometer. J. H. Kanzelmeyer, St. Joseph Lead Co., Monaca, Pa.

An important aspect of zinc oxide quality control is determination of trace elements. The direct reading spectrometer has provided a rapid and accurate method for analysis of zinc oxide for iron, lead, cadmium, silicon, manganese, copper, indium, and aluminum. As many as 10 samples per hour can be analyzed for these eight elements at a cost of about 15¢ per determination, a figure far below that of conventional methods. The coefficient of variation is less than 10% for all elements.

A brief description of the instrument and its operation is given, and the procedures used and problems encountered in developing the method are discussed. The preparation of adequate standards is outlined. The performance and economics of the use of the direct reader in the zinc smelter are presented.

6:00 p.m. Suppliers' Cocktail Party.

7:30 p.m. Division Banquet. Presentation of Charles Goodyear Medal to Dr. Wiegand.



Peter J. Debye

Friday Morning—May 6
L. J. Halpin, Presiding

9:00 a.m.—16. Introduction of Peter J. Debye by W. J. Sparks.

9:10 a.m.—17. Invited Paper. Latest Advances and Break-Throughs in the Physics of Polymers. Peter J. Debye, Cornell University, Ithaca, N. Y.

10:10 a.m.—18. Organo-Tin Molecular Sieve—A Latent Catalyst for Rigid Polyurethane Foams. J. E. Schmidt, F. M. O'Connor, and R. L. Mays, Linde Co., Division of Union Carbide Corp., Tonawanda.

Rigid polyurethane foams are becoming more important as insulating and structural reinforcing materials. The polyols and polyisocyanates used in preparing these foams are sufficiently active in the absence of a catalyst to cause polymerization, but at a relatively slow rate. In order to obtain practical polymerization rates and high quality foams, catalysts are used. A finite induction period is desirable to provide sufficient time for adequate mixing and to perform other necessary handling operations. The use of rigid polyurethane foams for foamed-in-place applications has greatly emphasized the need of delayed-action catalyst systems.

Certain organo-tin compounds have been found to be more active catalysts than many of the commonly used amine compounds and have made possible the production of high-quality foams by the "one-shot" method. The initiation of the foaming reaction catalyzed by the organo-tin compounds can be appreciably delayed by introducing these catalysts loaded on molecular sieves. The catalyst remains isolated during the induction period. Release is effected by both the displacing action of polar compounds in the formulation and also the heat which is evolved by the exothermic reaction.

Chemical-Loaded Molecular Sieve CW-4107, an organo-tin compound-loaded molecular sieve, provides a longer induction period along with a very fast polymerization rate. This paper presents data which show the utility of this catalyst system in formulations of the "one-shot" and "prepolymer" types for both water-blown and fluorocarbon-blown foams. The versatility of this system should also offer advantages in formulations designed for many other applications.

10:40 a.m.—19. Oxidations and Reductions at the Carbon Black Particle Surface. Andries Voet and Archie C. Teter, J. M. Huber Corp., Borger, Tex.

It has become more and more apparent that the outstanding properties of carbon blacks as reinforcing pigments for elastomers are not only connected with physical effects, but depend for an important part on chemical interactions at the particle boundary. The reactive groups are of quinone and hydroquinone character.

In this investigation, a new practical method is given for the rapid quantitative determination of the concentration of these groups on the carbon black surface.

In addition, a new approach to the condition of the quinone-hydroquinone equilibrium on the particle surface has been indicated by means of redox potential measurements of aqueous carbon black dispersions.

Finally, the intensity of the binding of oxygen by various types of carbon black was investigated by measuring oxygen release by subjecting the blacks to successively higher temperatures, up to 1200° C. Accurate data were obtained by means of a direct micro method for the determination of oxygen in carbon blacks.

Results are reported for various commercially available types of carbon blacks.

11:10 a.m.—20. Diene Rubber—Compounding and Testing. Ward A. Smith and James M. Willis, Firestone, Akron.

Diene rubber, a polybutadiene polymerized in solution with alkyl lithium catalyst, has been extensively evaluated in both laboratory and tire tests. Stocks with outstanding properties have been developed by blending with either natural rubber or SBR. Diene rubber in tire treads and body stocks leads to improved wear and cracking resistance, lower operating temperature, reduced rolling resistance, better high-speed performance, and increased traction on snow. Polybutadienes made with catalyst systems other than alkyl lithium gave no better performance than Diene rubber in tire service tests.

Conn. Rubber Group Takes A Look in Crystal Ball

A record crowd turned out at the Connecticut Rubber Group meeting on February 19 to hear a panel of experts predict some of the possibilities of the coming decade in a symposium called "Polymers for the '60's." The meeting was held in the Waverly Inn, Cheshire, Conn.

The meeting was opened by a lecture by Prof. Herman F. Mark, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., entitled, "New Polymers for the Rubber Industry." This was followed by a cocktail hour and dinner. The evening symposium consisted of four members and was moderated by John H. Fielding, Armstrong Rubber Co., West Haven, Conn. The speakers were Leon Talalay, B. F. Goodrich Sponge Rubber Products, Shelton, Conn., who covered cellular products; Herbert A. Winkelmann, Dryden Rubber Divison, Sheller Mfg. Corp., Chicago, Ill., who spoke on mechanical goods; Ray P. Dinsmore, Goodyear Tire & Rubber Co., Akron, O., speaking on tire rubbers; and John T. Blake, Simplex Wire & Cable Co., Cambridge, Mass., speaking on coming events in wire and cable.

This meeting celebrated the tenth anniversary of the Group and was the first to be conducted by the 1960 officers: V. P. Chadwick, chairman, Armstrong Rubber; F. B. Smith, vice chairman, Naugatuck Chemical Division, Naugatuck, Conn.; A. Murdoch, Jr., secretary, Armstrong Rubber; and Frank Villa, treasurer, Whitney Blake Co., New Haven, Conn. The committee for this meeting consisted of Chadwick, Smith, and R. W. Ward, E. I. du Pont de Nemours & Co., Wilmington, Del.



1960 officers of the Connecticut Group: *(left to right)* Frank Villa, treasurer; Frank B. Smith, vice chairman; Vincent P. Chadwick, chairman; and Alexander Murdoch, Jr., secretary

New Polymer Lecture

Dr. Mark set forth as his topic an attempt to outline, within the time limit allowed, what the probable results of recent developments are in the general field of large molecules in view of the possibility that some of these new materials might become important in the rubber industry. The speaker stated that he believed that there were a few developments that forecast the appearance of certain new materials that might be described as exceptional and that the general trend in polymers could be summarized, with a certain over-simplification, in terms of (1) potentially lower costs and (2) possibility for improved product performance.

It was suggested that lower costs would be realized on production of materials to meet the standard expected performance of today's products against temperature effects, solvents, abrasion, or other factors. Materials with improved performance characteristics will appear, but with relatively high costs.

In defense of the idea that lower costs for materials to meet conventional performance standards might be realized, Dr. Mark looked back over the history of polymerization. In the early stages of polymerization work effort was divided about equally between anhydrous systems and aqueous systems. The discovery and the development of the art and science of emulsion polymerization, however, swept most polymerization workers into the direction of the aqueous free-radical initiated systems. Today the pendulum has swung the other way, and considerable effort is being devoted to the ionic and non-aqueous types of polymerization. It is this type of production that will provide the events of special interest and show the way to lower-cost polymers.

The principal difference and advantage that the ionic type of polymerization has over the free-radical type system is the relative control of the process of monomer addition. The addition can be directed preferentially rather than the random arrangement of the free-radical addition. It is the existence of an ion pair which works on the monomer before it actually enters the chain that is, as far as is understood today, the principle of the various types of stereo-regulation, by making use of the Zeigler catalysts or the Zeigler-Natta catalysts or whatever other expansion has taken place.

The results of these stereo-regular polymerizations have produced linear polyethylene, both iso-tactic and syndotactic polypropylene, and iso-tactic polybutadiene. While the iso-tactic forms were produced first, and it is only recently that syndo-tactic forms have been made, it is now fairly well established that both forms are possible with any material. Much work is being done in this area on other olefins and particularly on copolymers.

Satisfactory catalysts for copolymer systems have been found to be those that are less discriminating rather than those that are very discriminating and successful in stereo-regulation. A result of not having the exact catalysts for completely random copolymers is that a small amount of block copolymer is formed, which in turn produces, in general, less favorable hysteresis properties. Current ethylene-propylene copolymers suffer from a slight tendency toward this poorer hysteresis which has been sufficiently correlated to the block structure. Dr. Mark stated that he believed that this temporary disadvantage would be overcome and that ethylene-propylene copolymers will be welcomed as a desirable member of the family of elastomers.

The problem in obtaining rubbers, which must come from copolymers, is to reduce the complexing capacity of the systems and try to arrive at materials, catalytic combinations, which accept both monomers. The steps which are used are essentially the working down from titanium tetrachloride to titanium tetraiodide or down to titanium ester halide or further to titanium ester cyanide. Beyond this step one abandons titanium and goes to vanadium. Similar steps may be made with other types of catalysts also. Higher temperatures may be used to reduce the discrimination, but this practice also reduces the rates. The rates of most of these reactions are quite rapid, however, so that this does not matter practically.

Another group of polymers which may be of considerable interest as time goes on are the polyacetides and the polyepoxides. It has been known for a long time that formaldehyde can be polymerized, but this product has not been capitalized upon until quite recently. The principle that had to be worked out depended upon the purity of the formaldehyde. It was not realized that a very high purity was required for this reaction. Other members



Connecticut Rubber Group officers and polymer symposium panelists: *(left to right)* Frank B. Smith, V. P. Chadwick, H. A. Winkelmann, J. H. Fielding, F. Browning, R. P. Dinsmore, J. T. Blake, L. Talalay

of this family should now follow.

In the realm of the higher-cost polymers for specific uses and purposes, the speaker suggested that he did not have too much new information to offer. He did note that possible improvements can be made in the silicone-type polymers. He also suggested that the radiation resistance of the fluorinated materials does limit their use in missiles or high-flying jets so that perhaps polymers based on some non-organic backbone such as aluminum and silicone, silicone and tin, or aluminum and tin may be used in these vehicles in the future.

Cellular Products

Leading off the evening panel was Leon Talalay speaking about polymers for cellular products. As an introduction, Mr. Talalay described cellular bodies as consisting of a two-phase system of a gas as the dispersed phase in a continuous phase of a solid material. The properties of such a cellular material are broadly determined by (1) the physical properties of the continuous solid phase, (2) the extent of the dispersion of the gaseous phase, (3) the continuity of the gaseous phase (closed or open cell), and (4) the physical properties of the gas in a closed-cell system. By varying these factors of matrix, density, cell type, and nature of gas, cellular materials of widely differing properties have been developed in recent years.

In the foam field there are both flexible, or rubbery, foams and the rigid, or hard, foams. Flexible foam has been dominated by natural latex foam rubber, but recent years have seen heavy inroads by flexible urethane and vinyl foams. More recently, SBR latices which can be used alone have also come into the picture.

In rigid foams the market has been dominated by expanded polystyrene either in block form or in the form of expanded beads. A competitive situation is rapidly developing, however, with rigid vinyl and urethane foams gaining some prominence. Other materials which may become competitors in the rigid cellular field are cellulose acetate, phenolic resin, and epoxy foams although as yet their uses are minor. Present uses of rigid foams are in the insulation, flotation, and packaging fields. The development of a sound sandwich core material for structural building material use could lead to a potential market that might well become astronomically large.

The field of comfort cushioning still is the largest user of cellular materials. It includes furniture, bedding, transportation seating, and miscellaneous padding uses. The stress-strain characteristic in compression is the major property of cushioning material. It is in matching this property of latex foam that the other materials have had their major difficulty, but some of the newer materials are meeting this requirement more closely.

There are also some specialty foams produced from neoprene and nitrile latices where the particular properties of the basic polymer are desirable in the finished product.

Another large area of use of cellular materials is in the chemically expanded sponge rubbers. These are usually used where elastic cellular materials much firmer than the flexible foams are required. Carpet cushioning, being the major user of this-type material, accounts for about one-half the total sponge rubber made. There are many other uses such as gaskets, door seals, pipe, and tubing insulation made from both open- and closed-cell types. Many of these applications require special elastomers.

Q. What is the future of sodium borohydride in latex foam?

A. Its specific advantage is greater thermal conductivity, but it is little used because of its high price.

Q. What is the potential of polyolefin polymers in cellular products?

A. I assume this means C23 type ethylene-propylene rubbers. Since they are made in a non-aqueous system, you can only get them in latex form by redispersing a solution of the polyolefin polymer in water and stripping the solvent out. This has been done experimentally, but I think their only possible application is in the field of chemically blown rubbers.

Q. What is the importance of temperature as a factor in manufacturing different cellular products? Is it desirable to have a range of different temperatures for producing a number of products?

A. Since the curing cycle is a function of temperature, the blowing-curing characteristic of a sponge system is the thing that determines temperature. You must operate at a good decomposition temperature for the particular expanding agents used. Thickness must be considered, and thick articles generally take a longer cure at lower temperature in order to realize full expansion without overcure of the outside surfaces.

Q. Is ozone resistance a major factor in compounding cellular products? What materials are suitable for building ozone resistance in cellular products?

A. More and more emphasis is being placed on ozone resistance of sponge article for atmospheric exposure. Choice of ozone-resistant polymer such as butyl may be made. Anti-checking waxes may be used and antiozonants also if staining is not a problem. A simpler way is to coat the sponge with an ozone-resisting coating such as neoprene latex or cement, Hypalon, or solid urethane polymers from solution.

Q. Can Porofor N be safely used to expand plastics, or does the toxicity of the decomposition products prevent its use?

A. This question is difficult to answer. Porofor N is used in Europe profusely. Adequate ventilation must be provided. It is difficult, however, to obtain a clean bill of health from our governmental agencies for products manufactured with Porofor N.

Q. What is best polymer and acceleration for nitrile sponge to be blown in hot air at 300° F?

A. You can use high or low nitrile content polymers. Temperature and acceleration depend on the decomposition temperature of the blowing agent. Dithiocarbamate acceleration and normal or slightly above normal sulfur is customarily used.

Mechanical Goods

Some history and expectations of the mechanical goods industry were given

by Dr. Winkelmann. He recalled that in the early days of this section of the rubber industry blueprints from the automotive industry would specify "black rubber" and that was all. Today specifications are used to describe accurately the material wanted, but the existing tables do not adequately serve the needs of the newer polymers and another revision of the specification is currently being presented for adoption. This new expanded table is designed to accommodate new elastomers as they become available.

He also indicated the rise in fillers and reinforcing agents from the original channel black and lampblack to today's thermal blacks, furnace blacks, and oil furnace blacks as well as surface treatment of zinc oxide, clay, and calcium carbonate to provide improved properties.

The modern use of accelerators, activators, aging inhibitors, and other additives was also discussed. The use of these materials was considered in some detail with specific regard to weather aging, adhesion, abrasion, high-temperature resistance, oil resistance, tear resistance, low-temperature properties, and high hardness.

Some final remarks concerning vulcanization by irradiation with beta rays and the injection molding of poly (vinyl chloride) concluded the talk by Dr. Winkelmann.

Q. What are the best polymers to use in high-temperature curing of 380 to 410° F.? Are there any materials that should be avoided at these temperatures?

A. Normally compounded natural rubber and SBR stocks may be used at these temperatures; you simply shorten the time of vulcanization. I don't know of any polymers that you must avoid at these temperatures.

Q. Can you recommend a yellow neoprene compound which will not chalk during a year or more of outdoor aging with minimum discoloration?

A. You can arrive at a good yellow compound by choosing a satisfactory chrome yellow or inorganic yellow pigment and use with titanium dioxide and clay. I cannot guarantee whether it will chalk or not. You will have to test each time.

Q. Can you recommend an economical acceleration for butyl which will have a cure time of five minutes at 340° F.?

A. A combination of MBT (it could be MBTS, but MBT is better) and Tuex with other tertiary acceleration will give a fast cure. Time of cure depends upon the thickness of the part. A five-minute cure on extruded weatherstripping takes a bit of doing.

Q. Is it possible to mold trimless parts?

A. Yes. The molds must be very, very carefully made without lands of any kind, and cost, roughly, twice as much as normal molds.

Q. What effect does raising temperature have on whiteness of stock?

A. I think the higher the temperature, the darker the stock will get.

Q. What are the advantages of transfer molding over compression molding? What are the disadvantages? Is it possible to injection mold rubber?

A. I don't think there are advantages to either if they are done correctly. If all factors are not under control, however, transfer molding might give better results since compression molding is subject to problems of flow-lines, lack of knitting, or soap folds. Injection molding is better than either of the other two because you inject rubber right into the cavity and cure in 90 seconds. Injection molding also is better with regard to weathering or aging of the part.

Q. What is your best recommendation for prevention of sun-checking in SBR and natural rubber, particularly non-staining light-colored compounds?

A. The best sun-checking resistance of SBR and natural rubber is obtained by using a microcrystalline wax and using the full amount—10 to 13 parts per 100 RHC, plus an antiozonant or antioxidant. Antioxidants can be used in light-colored compounds. In fact, the light-colored compound is better than a black one in resisting sun-checking, but may discolor from some other source.

Q. What type of metal should be used for a transfer piston and a transfer pot?

A. Speed ease mild steel will give you the best results. The clearance between piston and pot is critical. We have found 0.010-inch to be best for practical purposes. Closer tolerances cause sticking of the piston.

Polymers for Tires

Possible developments in the coming demand for tire rubbers was the subject of the talk by Dr. Dinsmore. He reviewed briefly the history of the use of total rubber for tires in the United States and the percentages of world rubber used through the years. He also dealt with the increasing use of synthetic rubbers, but suggested that our current ratio of two-thirds synthetic and one-third natural rubber is the maximum ratio allowable without an adverse effect on quality with the synthetic rubbers now in use. The newer elastomers with more natural-like properties may change this ratio in the future.

European synthetic rubber capacity, however, is only capable of providing about 20% of that area's rubber requirements. Even projected plant increases will not raise this to any great extent. If the price of natural rubber remains high, however, available export synthetic rubber from the United States might raise the ratio of synthetic rubber to 30 or even 35% of the European total usage.

The developments in ordered 1-4 polyisoprene do offer further progress to synthetic rubber in the United States, but the long development times and the still somewhat adverse isoprene price would indicate that this will not be too great a factor in the immediate future.

Cis 1-4 polybutadiene is another candidate for replacing some of the natural rubber usage. This material has been somewhat disappointing in its physical characteristics, particularly in resiliency and in handling properties in the raw state. The use of some natural rubber in the admixture does help solve the latter problem, and the plus values of abrasion resistance appear interesting.

The speaker expects that there will be additional polymers of the stereospecific nature. Noting that ethylene-propylene rubber has been announced and is the object of some study, he suggested that this will only be the first of a series.

The use of nuclear fuel for ships and planes will also impose problems for the rubber manufacturer. Even for tires it may be that the specialty rubbers will be of use where they may be subjected to the effects of this power.

He summed up the tire rubber position by saying that although the growth of the industry in this country may be expected to be at a much slower rate than that of the rest of the world, diversification of rubber types, caused by limitation of natural rubber supply and by new technological tire demands, will undoubtedly be greater in this decade than at any time previously.

Q. What are the major problems in producing butyl tires?

A. The major problems are (1) excluding the air, (2) complete segregation of the butyl and its compounds from other types of rubber, and (3) adhesion of fabric. The adhesion of nylon is especially hard, and it is necessary to use high-pressure curing (300 pounds) and 50% longer cure time to reduce removal temperature to prevent blisters and separation.

Q. How do you assure good splices from a factory and field standpoint when using high amounts of oil-extended rubber in the cap or sidewall compound?

A. Go back to the good old practices of a good strong cement, buffing before cement application, sufficient pressure, and hold it long enough to make it stick.

Q. What will be the impact of the wire tire on the U. S. market in the next three to five years?

A. I wish I was sure of that. I don't believe that the conventional wire tire has much future. The belted or Michelin X tire has more possibility, but its future depends very much on the economics of the situation. France has both lower labor costs and wire costs. In this country we have higher labor costs even if we import lower-cost wire.

Perhaps we can offset some of our labor costs by better mechanization. The great advantages are load carrying capacity and long tread wear. We may, however, develop textile tires which may do better.

Q. Are the different synthetic rubber producers manufacturing polymers of a reasonable degree of uniformity?

A. I think that increasingly better controls will make each producer's rubber more uniform in itself, and I think that same influence will slowly bring the same grades of rubber made by different rubber manufacturers closer together. I do think that the ultimate in uniformity may require some rather drastic changes in production plants.

Q. In terms of polymers, what is the most effective and practical way of decreasing air-wicking characteristics in a tire?

A. The type of polymer affects air-wicking. Butyl is best, SBR next, and natural rubber next; but with exposed cords wicking is less if you get better penetration of the adhesive cement, and the tighter your twist the less wicking.

Q. Are newer polymers better lending themselves to automation in tire making?

A. I don't see very much reason why they should unless perhaps better control of physical characteristics might help handling and building and thus help mechanization.

Q. Do you see any drastic changes in fillers, chemicals, or processing aids due to use of new elastomers in the future?

A. It may be possible that fillers may be tailored to fit the polymers. Black suppliers have already made beneficial changes that have helped in tire compounding and will undoubtedly make other changes.

Q. Will newer polymers reduce demand for reclaimed rubber?

A. No. In fact, if we make good-enough rubbers, reclaim's use may be enhanced.

Q. What would be the effect of the *cis* polymers on tread separation if used in heavy-tread highway-type truck tires?

A. The lower resilience of *cis* polymers would probably increase tread separation unless you can increase resilience by compounding methods.

Wire and Cable

Dr. Blake discussed the probable use of various polymers in the wire and cable industry in the next decade. He suggests that the major evolution which has been taking place in the use of insulating and protective materials since the war will progress further. Also, a host of newer materials may play an important part in the industry.

The speaker enumerated the qualities that are essential to the serviceability of the product. These properties are divided into three groups, electrical, physical, and chemical. The four electrical properties normally considered are (1) dielectric strength high enough to prevent breakdown at normal voltages or when surge voltages are produced in the system by lightning, (2) insulation resistance sufficient to prevent undue leakage losses, (3) power factor or loss angle sufficiently low so that losses will not be excessive with a.c. current, and (4) dielectric constant is important in determining the attenuation of signals in communication cables and the magnitude of charging currents in power cables.

The physical properties necessary in an insulation vary with service conditions, but include toughness and resistance to tear, abrasion, and compression. These properties must be stable with time. The insulation must also be able to withstand heating, and, above all, it must resist aging.

Chemical resistance usually is associated with ozone resistance, water resistance for underwater use, or other chemicals that might be in contact with the cable in outdoor or atmospheric use. There are also the special cases in industrial uses where specific chemical resistance is required.

Some of the materials that have made successful inroads into insulation uses are neoprene, plasticized poly (vinyl chloride), and polyethylene, with the thermoplastic materials gradually taking the larger percentage of the market for economic reasons. This trend will continue.

It was suggested that most new elastomeric developments have not been aimed specifically at the wire and cable industry, so that industry must examine each new offering to see if it can be adapted for wire use. Some of the newer specialty elastomers have been used to some degree in special cases.

In summation it was suggested that the line between rubber and plastics is becoming less clear with the advent of vulcanizing the thermoplastic materials used for wire insulation. Natural rubber as insulation has about disappeared in this country. The present trend in the use of rubber and thermoplastics will probably continue for the next five years and perhaps the next ten.

Q. What is the future of cross-linked polyethylene? How will this affect SBR?

A. Cross-linked polyethylene may well be used in increasing amounts. We must distinguish between cross-linked polyethylene and cross-linked polyethylene carbon black compounds. The latter have excellent physical properties and resistance to weathering, but the electrical properties are such that it is limited to low-voltage service and not to communication service. Cross-linked polyethylene without carbon black may be used for high-voltage service and in communications, electronics, and high-temperature hook-up wire.

Q. What is the action of lead oxide in quinoid cures of butyl?

A. Red lead is used to oxidize quinoid to its active form. The red lead oxidizes the pariquinoid dioxene to the nitroso form at normal curing temperatures but at a relatively slow rate at processing temperatures, thus avoiding scorching tendencies.

Q. Is lead essential for electrical stability, and, if so, why?

A. It would be inaccurate to say that lead is essential for electrical stability, and I assume we've been talking about butyl rubber. Lead does improve, however, the electrical stability of butyl compounds in water. We are not certain of the mechanism of this action, but it probably insolubilizes materials which would otherwise contribute to water absorption and therefore to electrical instability.

Q. What effect will the higher-temperature ratings have on the use of SBR, natural rubber, and neoprene? Can these materials be used on cables rated over 90° C?

A. The tendency toward higher ratings will decrease the quantities of these materials. SBR and neoprene are both in approved formulations today for service on conductors operating at 90° C. Probably, as we go beyound 90° C., their use will decrease.

Q. Is there justification of the oxygen-bomb test or air-pressure heat test for evaluating probable life of neoprene compounds?

A. It would be difficult to justify these tests on theoretical grounds. Yet, as a practical matter, these tests are used a great deal. An extensive history lets us interpret these tests with a fair degree of reliability.

Q. What are the upper limits of oven temperatures for evaluating neoprene compounds?

A. We use 212° F. a lot and have used 250° F., but above that you get surface oxidation and hardening that render tests at higher temperatures of no significance.

Q. Is there a fundamental difference in the electrical properties of elastomers produced by heterogeneous polymerization contrasted with those produced by emulsion polymerization?

A. I am not sure I completely understand the meaning of the question, but in practice there is a difference. In emulsion polymerization traces of emulsifier are left and are harmful to electrical properties; thus systems with no emulsifier are usually better.

Q. Would you discuss the future of nitrile-vinyl chloride compositions?

A. These materials puzzle me. Potentially they are very useful and can be used as thermoplastics or vulcanizates. The potential depends a lot on economics, and they may be used for special applications competing with neoprene, vinyls, and to a lessor degree with SBR, NR, and butyl. I don't anticipate any great growth for these materials.

Dinner-Dance Planned for April 30

Joining the growing number of rubber groups holding mixed social evenings. The Connecticut Rubber Group plans a dinner-dance on April 30 at Sanford Barn East in Hamden, Conn. A suppliers' cocktail hour at 6:30 p.m. will start festivities, followed by dinner at 8:00 p.m. and dancing.

F. B. Smith, Naugatuck Chemical, is general chairman for the affair, with F. H. H. Browning, Godfrey L. Cabot, directing the suppliers' party, and Carl Larsen, Wyrough & Loser, handling ticket sales. Also active is a women's committee consisting of Mrs. Browning, Mrs. R. W. Ward (Du Pont), Mrs. Larsen, Mrs. Smith, and Mrs. V. P. Chadwick (Armstrong Rubber).

"Specialty Rubbers" Topic in Northeast

The March meeting of the Elastomer & Plastics Group, Northeastern Section, American Chemical Society, consisted of an afternoon symposium on "Specialty Rubbers" and an evening speaker on high polymer structure, both jointly sponsored by the Group and the parent Northeastern Section.

The afternoon symposium was chairmanned by Eli M. Dannenberg, Godfrey L. Cabot, Inc., who introduced the subject and defined "specialty rubbers" as apart from SBR and natural. He then introduced the first speaker, Charles A. Berridge, General Electric Co., who discussed "Applications and Chemistry of the Room-Temperature Curing Silicone Rubbers."

These 100% solids pastes are normally cured with peroxides and employ catalysts that may be tin or lead soaps (octoates), or similar to dibutyl tin dilaurate. Control can be exercised by varying the type and concentration of catalyst and the temperature used. The properties of these compounds were described; their resistance to temperature extremes, dilute acids and bases, ozone, and their good electrical properties, ability to bond to metals (with primers) and to silicones and glass, and to release from molds were discussed.

The potting of electrical equipment with RTV silicone rubber and its use in molds, as sealants, in rockets, telephony, as a vibration damper, and as gears were shown with slides. RTV silicone rubber's ability to flow into cracks (to show minute surface variations) was quoted as one property used in measuring the corrosion of atomic equipment, and in removing dusted fingerprints from criminal evidence.

An explanation of peroxide cures and catalyst action was given, illustrated with slides.

The second afternoon speaker was James V. Fusco, Enjay Co., Inc., who spoke on "The Chemistry and Properties of Chlorinated Butyl Rubber." This speaker used slides to demonstrate the formation and properties of the raw polymer, and the behavior of various compounds with standard compounding ingredients. The compatibility of the polymer with other polymers was pointed out—an advantage that standard butyl rubber does not share.

The presence of the chlorine atom on the molecule makes possible the oxide-type cures, in addition to the cross-link-type cures possible through sulfur curing.

Applications of chlorobutyl rubber in hot locations, especially in the presence of moisture, were described, and increasing use of the rubber was predicted by Mr. Fusco.

Following a preprandial hour in the Campus Room of the Graduate House, a dinner in honor of the afternoon and evening speakers was held with about 150 in attendance. There were about 100 present at the afternoon symposium.

About 80 in the evening heard Turner Alfrey, Jr., Dow Chemical Co., discuss "Molecular Structure and Mechanical Behavior of High Polymers."

The next meeting of the Elastomer & Plastics Group will be at Science Park, Boston, Mass., April 19. The speaker will be Stewart Brams, Dayton Chemical Products Laboratories, Inc., whose topic is "New Developments in Rubber-To-Metal Bonding."

Perlberg at Chicago

The Chicago Rubber Group, Inc., held a dinner-meeting on January 29 at the Furniture Club, Chicago, Ill. The guest speaker was S. Everett Perlberg, Adamson United Co., who spoke on "A Review of Basic Modern Mill Room and Calendering Equipment." There were 180 members and guests present.

Mr. Perlberg discussed new designs and applications of mills, new mixing techniques, calender design and application, and a comparison of the Intermix and Banbury. This paper has been summarized previously.[1]

[1] RUBBER WORLD, Jan., 1960, p. 528.

Boston RG Hears Nebeker on IR

The spring meeting of the Boston Rubber Group was held at the Hotel Somerset, Boston, Mass., March 18, and consisted of an afternoon symposium, a cocktail hour, dinner, and an after-dinner speaker in the evening. More than 150 were present at the technical session and 266 had reservations for the dinner.

The afternoon speaker, introduced by Group Chairman James J. Breen, Barrett & Breen Co., was H. R. Nebeker, Shell Chemical Corp., Torrance, Calif., who spoke on "Polyisoprene and Its Vulcanizates."

Mr. Nebeker introduced his subject by giving a brief historical review of synthetic rubber development, including the Shell Oil Co. interest in polyisoprene. A review of this talk has previously been reported.[1] An informative question-and-answer period followed.

Following dinner, George Herbert, Tyer Rubber Co., read the secretary-treasurer's reports for 1959; the chairman presented the past chairman, William King, Acushnet Process Co., with a tie-clasp marking his tenure in office; and George H. Hunt, Simplex Wire & Cable Co., education committee chairman, announced that 44 students were enrolled in the "Principles of Rubber Technology" course being given by Charles Griffis, Quartermaster Eng. & Equip. Command, at Northeastern University.

The after-dinner speaker was Thomas Fitzgerald, *Boston Globe*, who spoke on the sports and players of Boston and other teams, in hockey, golf, and baseball, and on sports writing.

The next meeting of the Boston Group will be the summer outing at the Andover Country Club, Andover, Mass., June 17.

[1] RUBBER WORLD, Feb., 1960, p. 693.

Aid/Disaster Meeting

The Fourth Annual Industrial Mutual Aid & Disaster Control Conference will be held in Cincinnati, O., May 18-20, with a special Air Power & Space Show at Wright-Patterson Air Force Base, Dayton, O., on May 21, according to its sponsor, The National Institute for Disaster Mobilization, Inc., New York, N. Y. Highlights of the conference will be a dramatic field exercise—"Disaster Strikes in Evendale (Ohio)"; the banquet address by Lt. Gen. Joseph F. Carroll, Inspector General-USAF; and an impressive "Air Power & Space Show."

Industrial, government, and military officials and other specialists from here and abroad will meet in the Netherland-Hilton Hotel, Cincinnati, for three days of consideration of problems and techniques in disaster prevention and control through utilization of Industrial Mutual Aid in coping with major disasters in industrial communities. Exhibits of products and services designed to detect, eliminate, and minimize or control potential hazards, emergencies, and disasters will be displayed at the hotel during the conference.

ASTM D-24, Carbon Black, Activities

Committee D-24 on Carbon Black met in Chicago on February 2 and 3 in conjunction with the parent American Society for Testing Materials "Committee Week." Six subcommittees held meetings on Tuesday, and the committees as a whole met on Wednesday with 40 members and guests present.

Subcommittee Reports

Subcommittee 1—Physical Testing. J. F. Svetlik, Phillips Chemical Co., chairman. Four tentative methods were recommended for advancement to a permanent standard. D 1514-57T, Tentative Method of Test for Sieve Residue from Carbon Black; D 1513-57T, Tentative Method of Test for Pour Density of Pelleted Carbon Black; D 1511-57T, Tentative Method for Pellet Size Distribution of Carbon Black; and D 1508-57T, Tentative Method of Test for Fines Content of Pelleted Carbon Black. Two of these, however, did contain editorial changes in the recommendation.

Editorial changes in D 1511-57T consisted of (a) specification of the hammer speed, rotation speed, and type of stopper; and (b) diagram and details of the Ro-Tap machine. Editorial changes in D 1508-57T consisted of (a) a footnote to be added to refer to ASTM D 1511 for a description of the apparatus; (b) under procedure, section 3(e) to be revised to read, "Allow the sieve assembly to shake for the specified time"; (c) under report, the sections 5(1) and 5(2) to be changed to 5(a) and 5(b); (d) under report, section 5(c) "running time of the test" to be added.

D 1507-57T, Tentative Method of Test for Attrition of Pelleted Carbon Black, was recommended for withdrawal as it was felt the Fines Test, as rewritten, will be sufficient.

The mass strength test for pelleted carbon black was discussed quite extensively. Results were reported of a program conducted in Texas where representatives of the producers met in a single location, specified the conditions and end-point, and tested well-blended samples of black in each other's presence to determine what level of reproducibility could be obtained where everyone was using the same equipment under identical conditions. Differences between highest and lowest values were: 5 pounds for SAF, dry pelleted; 8.5 pounds for ISAF, wet pelleted; 9 pounds for HAF, wet pelleted; 3 pounds for HAF, dry pelleted; 9 pounds for FEF, wet pelleted; and 7 pounds for SRF, wet pelleted. Based on these data, one concludes that the reproducibility is only about ±5 pounds on a single piece of equipment. If differences in results between pieces of equipment, due to the finish of the cylinder, are superimposed on the results of the foregoing tests, the reproducibility between results obtained by different laboratories would be expected to be greater still.

A task force was appointed to coordinate a program with Cabot, Phillips, Huber, Columbian, United, and Continental Carbon companies and different consumer plants to delve further into the Mass Strength Test with the following considerations: (A) how do the mass strength and fines tests correlate with each other, and how do they correlate with shippability and unloading, (B) how does the mass strength test correlate with dispersion, and (C) can a better test be devised to measure the crushing strength of pelleted carbon black? This last test might be based on tests on individual pellets.

Western Electric Co. has offered to furnish details of a machine with a threaded inner surface cylinder that should be more duplicable in surface characteristics. As soon as it is available, a machine shop will be found to make several cylinders and forward the information to the task force.

Subcommittee 2—Chemical Tests. L. G. Mason, B. F. Goodrich Co., chairman. Four tentatives were recommended for advancement to permanent standard in this subcommittee also. D 1510-57T, Method of Test for Iodine Absorption Number of Carbon Black; D 1512-57T, Method of Test for pH Value of Carbon Black; D 1619-58T, Methods of Test for Sulfur Content of Carbon Black; and D 1620-58T, Method of Test for Volatile Content of Carbon Black.

Footnotes were recommended for two of these methods. For D 1510-57T the footnote suggested states: "This test is not suitable for characterization of thermal blacks." The footnote for D 1620-58T states: "The volatile content test applies more specifically to those blacks used by the paint and ink industry."

The latter footnote was voted by the subcommittee as an alternate to recommending that the method be dropped since it was felt that it was of use to the paint and ink manufacturers, but no representation from that industry was present to express an opinion.

Subcommittee 3—Optical Tests. John E. Smith, J. M. Huber Corp., chairman. This subcommittee voted to retain D 1618-58T, Method of Test for Discoloration of Benzene by Carbon Black, as a tentative standard.

This test is being used by producers and some consumers as a control test on non-staining blacks. A task group of subcommittee 15 of Committee D-11 is working on a standard test for measuring staining tendencies of carbon blacks from tire carcass compounds through white sidewalls (migration stain), and it was felt by this subcommittee 3 that no action should be taken on D 1618-58T until the results of this work are known.

Subcommittee 4—Nomenclature of Carbon Blacks, J. H. Gifford, Witco Chemical Co., chairman. This subcommittee is currently working on nomenclature for rubber-grade carbon blacks, with a table to classify each black. This classification will be discussed at the June, 1960, meeting.

Since two grades of SRF and ISAF blacks are recognized by the industry, the subcommittee voted to differentiate these grades as follows: SRF-LM for the lower modulus SRF, SRF-HM for the higher modulus SRF, ISAF-LM for the lower modulus ISAF, and ISAF-HM for the higher modulus ISAF.

Subcommittee 5—Sampling. R. O. Treat, Huber, chairman. The report of the letter-ballot on a sampling procedure for packaged shipments of carbon blacks was announced. There were 26 affirmative votes, 2 negative, and 12 not voting.

The first negative vote suggested that a footnote should be added to section 3(b) to the effect that limitations of the number and locations of samples taken should only be necessary when pellet quality tests are made; otherwise samples could be taken at any convenient location. The subcommittee felt that this point was a good one and voted to insert a footnote to this effect.

The second negative vote suggested use of a sample splitter for combining and preparing the two samples taken from a single bag into a single composite sample. This suggestion also was accepted as a good point by the subcommittee, and it was voted to include it in section 3(b).

With the two negative votes reconciled, the subcommittee voted to recommend the method to ASTM for adoption as a tentative method.

The task group on sampling bulk shipments reported that considerable data have been obtained but that a report will have to wait until the June meeting.

Subcommittee 7—Specifications. J. H. Gifford, Witco, chairman. Proposed specifications were agreed upon and recommended for adoption as a tentative method for screen residue tests, fines tests, and values in crude rubber vulcanizates when run in tests in accordance with D 1508-57T, Tentative Method of Test for Fines Content of Pelleted Carbon Black; D 1514-57T, Tentative Method of Test for Sieve Residue from Carbon Black; and an interim method based on D 1522-58T, Tentative Methods for Testing Carbon Blacks in Rubber.

Three task groups were also set up. The first will investigate the possibility of obtaining better differentiation between SRF-LM and SRF-HM, particularly by using 75 parts black in place

of 50 parts in an interim method based on D 1522-58T. The second group will investigate maximum practical specification limits for heat loss of carbon blacks shipped in bulk. The third group will investigate maximum specification limits for heat loss of carbon blacks shipped in bags.

Main Committee Meeting

The meeting of the main committee, D-24, reported the following actions in addition to those of the subcommittees above. The results of letter ballots on two standards were reported. The new tentative method for sampling of packaged shipment of carbon black was approved by 28 affirmative, 0 negative, and 12 abstaining votes, and the adoption of D 1512-57T as a permanent standard was approved by 28 affirmative, 0 negative, and 10 abstaining votes.

Subcommittee 6—Coordination with Other Committees—was dropped from the committee by the advisory committee since there have been no assignments directed to it since the organization of Committee D-24. The advisory committee will assume the functions of this committee if the occasion should arise.

"Lexan Resins" Topic at Fort Wayne R&PG

The third meeting of the 1959-1960 season of the Fort Wayne Rubber & Plastics Group was held at the Van Orman Hotel, Fort Wayne, Ind., February 11. A bountiful prime rib dinner was served to 168 members.

Harry F. Ackerman, polycarbonate market development, chemical materials department, General Electric Co., Pittsfield, Mass., gave a talk illustrated with slides on "Lexan Resins."

Mr. Ackerman described the development of polycarbonate thermoplastic resins in the role they serve as a replacement for metals or their use in combination with metals in certain applications. Typical of these plastics is G-E's Lexan resin, which has such properties as unusual strength, heat resistance, dimensional stability, and resistance to creep and cold flow under load. The chemistry, physical, electrical, and other properties of Lexan were presented in some detail.

The properties of Lexan resin make it suitable for a wide variety of applications, continued Ackerman. It is presently being used in business machine parts, military components, electrical and electronic parts, instrument, automotive, pump, appliance, and communication equipment, and many other industrial and consumer applications.

One of the most important considerations for Lexan resin is the steady upgrading of materials' specifications by engineers and designers. The present trend is toward automation, miniaturization, higher operating temperatures, improved performance, cost reduction, elimination of flammable materials, and weight reduction. It is in this general area that Lexan resin is finding many of its most important applications, concluded Ackerman.

The next meeting of the Group is scheduled for April 14 at the Van Orman Hotel.

NYRG Dance May 20

The New York Rubber Group will hold its first dinner-dance at the Hotel Roosevelt, New York, N. Y., May 20, according to an announcement at the Group's March 25 meeting by E. S. Kern, R. T. Vanderbilt Co., Group chairman. To be held in the hotel's Palm Terrace Suite, the affair will be preceded by a cocktail party, and dancing will take place from 8:00 p.m. until midnight. A maximum of 400 persons (200 couples) can be accommodated, and the cost will be $25 per couple.

Chairman for the dinner-dance is L. J. Koch, Westwood Chemical Co., who is assisted by B. A. Wilkes, Godfrey L. Cabot, Inc.; and M. E. Lerner, *Rubber Age*. Detailed announcements will be mailed shortly by the Group's secretary-treasurer, Mr. Lerner.

ASTM D-13 Meeting On Textiles, Tire Cords

Committee D-13 on Textile Materials of the American Society for Testing Materials held its spring conclave March 1-4 at the Sheraton-Atlantic Hotel, New York, N. Y. Of special interest were the activities of subcommittee A-9, which is charged with trying to revise and expand tire cord testing procedures.

Tire Cords

In regard to old business, W. R. O'Donnell, Industrial Rayon Corp., gave a task group report on atmospheric conditions *versus* moisture regain, as described in D 885-59T, Methods of Testing and Tolerances for Tire Cords from Man-Made Fibers. Since the last meeting this task group has polled on what test methods are being used for determining regains in Tyrex cord. A letter-ballot will be sent out after the next meeting.

The clarification task group, headed by F. J. Kovac, of The Goodyear Tire & Rubber Co., has reviewed since the last meeting, in general, test methods and letter-ballots. G. R. Harrison, E. I. du Pont de Nemours & Co., Inc., reported for this group various changes on denier, tolerances, hot strength, growth, and wet contractile force of D 885-59T. The main changes involved were editorial rather than revision of testing procedures.

Mr. Harrison also reported on a dip pickup procedure (D 885-59T) which had been done in liaison with D-11 (rubbers) of ASTM. This group has developed a satisfactory static pull test method of testing dip pickup and expects to submit a letter-ballot to D-11 for voting. He also discussed a chemical method of measuring dip pickup used in work in which 16 laboratories participated and found reasonable agreement. The scope of this procedure is to determine the amount of dip on nylon tire cord by dissolving the nylon with formic acid, leaving the dip as a residue. This procedure will be submitted as a letter-ballot. More work is needed on rayon cord dip pickup before a recommendation can be given.

M. C. Bullock, of The B. F. Goodrich Co., suggested that the impact testing of tire cords be studied by members of A-9. At the next meeting he proposed that active members submit short papers on this topic, to give information on the background, current thinking, and methods used in the impact testing of tire cords. Members agreed to explore this area, with the aim in mind of expanding D 885-59T to include an impact testing procedure.

In a special report, W. G. Klein, Fabric Research Laboratories, Inc., summarized work which he has been conducting on delineating the nature of cord fatigue in tires.[1] Comments from the fioor were in apparent agreement that these studies should be continued before the nature of fatigue could be characterized. Some members of A-9 felt that the results of this test were of little significance because the tires used in the test were overdesigned.

Chafer Fabrics

A report of the task group on chafer fabrics given by Mr. Bullock, the group chairman, indicated that the group is working on a rewrite of D 122-37, Methods of Test for Tire Fabrics Other Than Cord Fabrics, to include the testing of other fibers. Additional work is needed before any revision of standards can be recommended.

Fabric Test Methods

Chairman of subcommittee B-9 on Fabric Test Methods, N. J. Abbott, Fabric Research Laboratories, reported that B-9 is collecting letter-ballots on the proposed revision of D 334-40, Methods of Test for Cotton Goods for Rubber and Pyroxylin Coating, in regard to manganese content, sizing, nonfibrous materials classifications, and addition of osnaburgs. No changes in other fabric test methods are contemplated at this time.

[1] RUBBER WORLD, Mar., 1960, p. 866.

RABRM Symposia on Equipment-Mixing

At the annual exhibition of the Physical Society of Great Britain held in London, England, January 18-22, the Research Association of British Rubber Manufacturers displayed some very interesting equipment which it has developed. The instruments were developed to measure the physical properties of rubber-like materials in various forms. All but one of the instruments shown depend on a common principle by which force is measured by first converting it into a very small movement which is detected and measured by the electrical charge it produces. This transducer is a differential displacement transformer used in association with a proof ring.

RABRM Testing Equipment

The RABRM electronic tensile tester is designed to carry out and record tensile stress-strain measurements on a wide variety of materials at temperatures from —50 to 250° C. This tester employs the combination of proof ring and transducer to measure the applied load with automatically selected load ranges, followed by electrical conversion of load to stress in desired units on adjustment of controls for the initial cross-sectional area of the sample. A simple mechanical/-electrical device automatically measures and records the strain.

The RABRM dynamic tester has been designed to cover a wide range of operating conditions in order that the full-size or scaled-down versions of complex anti-vibration or shock absorber units can be tested under the conditions actually met with in service. The frequency range is from 0.001 to 50 cycles/second at a strain amplitude which can be varied from 0.001- to 0.5-inch. A temperature range of —70 to 200° C. can be covered. Facilities for prestressing the rubber are incorporated.

The RABRM friction apparatus measures the variation with load of the coefficient of friction of various polymers when sliding against a flat plate of the desired material at a constant velocity. A flat ground steel plate is pulled by a geared induction motor under a loaded polymer sample which is held by a system of springs. The friction load is proportional to the displacement of a double cantilever spring and is measured by means of a differential transformer.

The RABRM rope friction machine measures the frictional forces developed by passing a rope or belt over the surface of a sheet of rubber or other material. The strip of material is secured to a small diameter cylindrical mounting which rotates against a spring. Rotation of the mounting is magnified mechanically before measurement with a differential pick-up. The rope, under the action of a constant weight, is dragged across the sample for a prearranged small interval of time. Values of the friction coefficient can then be determined.

It is convenient for an interpretation of the underlying processes in polymer degradation to measure the tension intermittently, at a constant elongation of a strip of rubber under aging in an unstretched state. The RABRM intermittent stress relaxation apparatus is designed for this purpose. The rubber strip is enclosed in a vessel which can be immersed into a thermostat bath at a controlled temperature.

The Shawbury Curometer is the only one of this group of instruments which does not depend upon the use of the differential transformer displacement pick-up. It has been designed to assist in the routine evaluation of the curing characteristics of rubber, but has extensions to any system in which flow or elasticity are changing.[1]

RABRM Symposium on Mastication

The Research Association of British Rubber Manufacturers held a successful symposium on "Millrooms, Mastication and Mixing", December 8-10, for its United Kingdom member firms at Attingham Park, near Shrewsbury, England. Several interesting papers were presented.

W. F. Watson, director of research at RABRM, gave a paper entitled, "The Theory of Mastication," in which he laid stress on the role of peptizers in hot and cold mastication.

J. R. Pyne, also of RABRM, outlined a recent series of experiments on the role of peptizers in hot mastication on roll mills and in internal mixers. The usefulness of peptizers for mastication in internal mixers is generally recognized, but it is not so well known that some are effective at the lower temperature on roll mills.

G. N. Welding, National College of Rubber Technology, London, discussed "The Mechanism of Mixing on Roll Mills." It was shown how the flow of material in the bank could be calculated, and an experimental modification of a two-roll mill which produces a considerable reduction in the normal mixing time was described.

Another visiting speaker, C. H. Leigh-Dugmore, reviewed "The Importance of Dispersion and Its Estimation." A microscopic method of estimating dispersion developed at the Dunlop research center was described.

The remaining four lectures were devoted to practical details of economic importance associated with the operation of factory millrooms and reported some of the major conclusions arrived at by the RABRM operational research team. Speaking on "Millroom and Drugroom Arrangements" and "Internal Mixers, One and Two Stage Mixing," T. J. Daniel discussed the usual causes of low production in millrooms and briefly reviewed recent developments in mixing and handling equipment.

W. C. Wake also gave two papers. "Mastication in Large Internal Mixers" was devoted to how an efficient masticating program could be planned for internal mixers. The second lecture dealt with "Productivity and Investment" as applied to the provision of increased mixing capacity in a rubber factory.

On the last day of the symposium the delegates were shown around the RABRM laboratories where demonstrations of rapid plastimetry and the use of peptizers on two-roll mills were given. Mr. Leigh-Dugmore also demonstrated his method of measuring dispersion.

[1] RUBBER WORLD, Oct., 1959, p. 18.

IR Is Tlargi Topic

About 280 members and guests attended the March 1 meeting of The Los Angeles Rubber Group, Inc., held at the Biltmore Hotel, Los Angeles, Calif. The meeting, featuring a "Past Chairmen's Night," was presided over by A. H. Federico, of C. P. Hall Co. of California, and chairman for the year 1958. High jinks and the initiation of three new members of GLTPC (Grand Lodge of Tlargi Past Chairmen) was presided over by Ed Royal, H. M. Royal, Inc.

Some 85 were in attendance at the technical session to hear R. D. Sullivan, Shell Chemical Corp., Torrance, Calif., speak on "Shell Isoprene Rubber."

Shell Isoprene Rubber, produced in commercial-scale equipment since last spring, is handled in general like natural rubber and offers the same advantages of high resilience and low heat buildup, reported Mr. Sullivan. However, some variations from the techniques and formulations used with natural rubber are required to achieve optimum properties. The speaker also discussed suggested procedures for compounding as well as the effects of various carbon blacks and accelerator levels required to obtain the best overall balance of properties.

The Tlargi Foundation Technical Conference will be held June 1-2 at the Mayfair Hotel, Los Angeles. Speakers for the conference have been selected from those who presented papers at the recent International Rubber Conference in Washington, D. C. This is one of the great steps forward that Tlargi has taken in the technical field and promises to become an annual event. A large West Coast attendance is expected as well as several visitors from the eastern part of the country.

Weather Subject Of Quebec R&P Meeting

The weather figured quite prominently in the program of the Quebec Rubber & Plastics Group meeting held in the Queen's Hotel, Montreal, P.Q., Canada, on March 17. The evening was very wild, with a heavy snowfall that had begun early in the day so that it was a hardy group indeed that turned out to hear George Vacca, Bell Telephone Laboratories, Murray Hill, N. J., speak about weathering effects on rubbers. About 50 members and guests were present, with the usual fine Canadian spirit much in evidence.

In his talk Mr. Vacca discussed some of the history of weathering, how it is recognized, what some of the different effects are, and some of the problems that arise in trying to develop accelerated tests that will correlate with actual results. As a general rule this weather aging shows up as cracking on rubber parts, with sunlight activated cracks described as alligatoring or random cracks; while ozone cracking, which can occur even in the dark, tends to run in the direction of the stress. It was shown that the random-type cracks can be produced by ozone, however, if stress is applied in more than one direction.

During the course of the talk and during the question-and-answer period that followed, Mr. Vacca acknowledged that considerable additional information is still required before the effects of high ozone concentration or moisture in accelerated testing can be definately correlated with environmental testing. He suggested that these accelerated tests are very useful for quick screening of possible compounds, but that outdoor testing must still be used for complete results. As an example, the speaker mentioned results that are still being obtained from periodic returns of drop cords made by the Bell Telephone Co. many years ago in the first attempt to utilize neoprene jackets. While these cords, in use in a New Jersey area, are not up to present-day compounding standards, they are still providing much valuable information.

A discussion on the use of finishes or coatings to aid in providing weathering resistance was also included in the talk.

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AMERICAN CHEMICAL CORP. reports that its new chlorinated hydrocarbon facility at Long Beach, Calif., is now on stream. Ethyl chloride, vinyl chloride, and ethylene dichloride are now being produced from basic raw materials for the first time on the West Coast in the new $7-million plant. American Chemical Corp. is jointly owned by Stauffer Chemical Co. and Richfield Oil Corp.

CALENDAR of COMING EVENTS

April 20
Quebec Rubber & Plastics Group and Montreal Section, CIC. Joint Meeting on "Industrial Development." Queens Hotel, Montreal, P.Q., Canada.

April 22
Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.
Chicago Rubber Group. Furniture Club, Chicago, Ill.

April 29
Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Rubber Chemical Salesmen's Association of Akron. University Club of Akron, Akron, O.

April 30
Connecticut Rubber Group. Dinner-Dance. Sanford Barn East, Hamden, Conn.

May 3-6 *(Note corrected dates)*
Division of Rubber Chemistry, ACS. Statler Hotel, Buffalo, N. Y.

May 18-20
Fourth Annual Industrial Mutual Aid & Disaster Control Conference. Cincinnati, O.

May 20
New York Rubber Group. Dinner-Dance. Hotel Roosevelt, New York, N. Y.
Connecticut Rubber Group.

May 21
Air Power & Space Show. Wright-Patterson Air Force Base, Dayton, O.

May 23-26
Design Engineering Show. Coliseum, New York, N. Y.

May 27
Rubber Chemical Salesmen's Association of Akron. University Club of Akron, Akron, O.

June 3
Quebec Rubber & Plastics Group. Golf Tournament. St. Hyacinthe, P.Q., Canada.

June 4
Southern Ohio Rubber Group. Inland Activities Center, Dayton, O.

June 9
New York Rubber Group. Outing. Doerr's Grove, Millburn, N. J.
Rhode Island Rubber Club. Outing. Pawtucket Country Club, Pawtucket, R. I.

June 10-11
Southern Rubber Group. Birmingham, Ala.

June 17
Akron Rubber Group. Outing. Firestone Country Club.

June 17
Boston Rubber Group. Outing. Andover Country Club, Andover, Mass.

June 24
Detroit Rubber & Plastics Group, Inc. Outing. Western Country Club.

June 26-July 1
American Society for Testing Materials. Annual Meeting and Subcommittee Meetings. Atlantic City, N. J.

August 2
New York Rubber Group. Golf Tourney. Forsgate Country Club, Jamesburg, N. J.

August 19
Philadelphia Rubber Group. Annual Outing. Manufacturer's Country Club, Oreland, Pa.

September 6-16
Production Engineering Show. Navy Pier, Chicago, Ill.

September 8-9
Chemical Institute of Canada and National Research Council. Tenth Canadian High Polymer Forum. Alpine Inn, Ste. Marguerite, P.Q., Canada.

September 10
Northern California Rubber Group. Outing.
Connecticut Rubber Group. Outing.

September 11-16
American Chemical Society. New York, N. Y.

September 13-16
Division of Rubber Chemistry, ACS. Hotel Commodore, New York.

September 29
Southern Ohio Rubber Group. Engineers Club, Dayton, O.

September 30
Rubber Chemical Salesmen's Association of Akron. University Club of Akron, Akron, O.

October 4
The Los Angeles Rubber Group, Inc.

October 7
The Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.

October 7-8
Southern Rubber Group. New Orleans, La.

October 9-11
Rubber & Plastics Division and Erie Section, American Society of Mechanical Engineers. National Conference of Rubber and Plastics Engineers. Hotel Lawrence, Erie, Pa.

WASHINGTON REPORT

By JOHN F. KING

RMA "Fact Sheet" Clarifies 1958 Food Additives Law

A question-and-answer "fact sheet" clarifying the applicability of the Food Additives Amendment of 1958 to items in their line was distributed by the Rubber Manufacturers Association, Inc., New York, N. Y., on March 8 to hundreds of companies making rubber products used in the food and beverage industries.

RMA President Ross R. Ormsby said the questions posed by the industry and answered by officials of the Food & Drug Administration at a conference with a Special Industry Committee on Food Additives were designed to guide manufacturers in determining their responsibilities under the Act. He said that much confusion as to the applicability of the Amendment, which became operative March 6 has existed within the industry.

Several thousand rubber products made by hundreds of firms are used in the food and beverage industries. The movement of food and liquids in processing plants by rubber conveyor belts and rubber hose is a typical example. Rubber gaskets, seals and washers of infinite size and variety are used in all types of food and beverage machinery and containers. Rubber-covered rolls are used on machines producing dry foods. Machine milking was made possible by rubber devices. Many other rubber parts are important components of pumps, mixers, sifters, and other food machinery.

All these rubber products used in the food and beverage industries have been developed, designed, and engineered to perform their functions efficiently and economically. Their use has been accepted because they do a better job than any possible competing materials. Because of their use in the food and beverage industries, manufacturers of these products have always exercised utmost care to make them safe and durable. The provisions of the Food Additives Amendment of 1958 are broad enough to encompass some of these rubber products because they come into contact with foods in process, although in no case could a rubber product be classified as an intentional or direct food additive.

The fact sheet makes clear that the Amendment does not require a manufacturer to apply to FDA for "approval" of a specific product and points out that it is each individual company's responsibility to determine whether a given product complies with the terms of the Act. Since September 6, 1958, the FDA has given only advisory opinions as to the relative safety of a product that comes in contact with food.

In commenting on the attached questions and answers in a letter to the RMA, E. T. Wulfsberg, Food & Drug Officer for the Department of Health, Education & Welfare, described them as "an accurate and informative expression of the conversations at the meeting with the RMA and consistent with FDA interpretation and understanding of the Food Additives Amendment".

Questions and Answers on the Food Additives Amendment of 1958

Following herewith are the questions, and the answers approved by the FDA:

Q. In general terms, how is the rubber industry affected by the Food Additives Amendment?

A. The amendment is designed to prohibit the use in food of additives which have not been adequately tested to establish their safety. As you know, the law applies to both "direct" and "incidental" use. You are apparently concerned with the possibility of an incidental additive. From a legal standpoint, you may not be affected by the law and, therefore, are exempt from its provisions if your product meets any of these three criteria.

1. During the product's use it cannot reasonably be expected to become a component of the food or otherwise affect the characteristics of the food.
2. During its use it does impart a component to the food and that component is generally recognized as safe.
3. The use of the product was specifically sanctioned or approved by the FDA prior to September 6, 1958.

Q. Does the FDA determine what products are covered by the law?

A. No. The amendment legally defines a "food additive" and establishes a procedure for regulating its use. It is the responsibility of each manufacturer to determine if his products are affected by this law. However, FDA will give its opinion as to the status of any substance if supplied with the necessary facts.

Q. Must a manufacturer apply to the FDA for an approval to continue making and selling his product?

A. No. Unless it is a food additive for which safe usage must be established by regulation. The amendment does not establish a licensing concept or procedure. A firm still has the right to decide for itself whether its product is subject to the Food Additives Amendment, and if it thinks it is not, FDA has the obligation of proving in court that it is, before FDA can maintain actions against the product or the firm.

Q. Does it follow, then, that FDA expects each manufacturer to determine himself if his products are affected by the law?

A. Yes. As indicated by the answer to your first question, a product is not covered if it meets any of the three tests. If it does not meet any of these, then a manufacturer should proceed with caution and conduct his own investigation and tests to determine if his product imparts an unsafe component to food. FDA expects each manufacturer to draw upon the scientific and expert knowledge within or without his company and industry to determine if he is complying with the law.

Q. Since the law and regulations do not require FDA approval or license, how do you explain some advertising and publicity by certain companies claiming they have received FDA "approval" under this law?

A. There are two separate circumstances that might be involved here.

First, the law provides and paragraph 121.3 (c) of the regulations explains that the amendment does not apply to food additives for which FDA granted a specific sanction or approval

prior to the enactment of the amendment on September 6, 1958. In this case, therefore, manufacturers of food additives who have received such prior sanctions or approval may properly make this claim.

The second circumstance might relate to FDA action under paragraph 121.3 (d) of the regulations which provides, "The Commissioner, upon written request, specifying the intended conditions of use and other pertinent information about a substance, will advise an interested person whether in his opinion the substance is a food additive."

This provision was placed in the regulation to assist manufacturers who really did not know whether their product was a food additive as defined in the amendment, or whether any component that was imparted to food through the use of the product is recognized as safe.

Companies who have availed themselves of this regulatory provision have supplied information about the use of their product, what it is made of, and the results of investigations indicating the product's performance in the presence of food. For example, they may have conducted extraction tests using simulated food solutions under exaggerated conditions to demonstrate that no component of the product migrates into the food solution. They may have supplied data showing some loss of material during the product's use, as in a rubber conveyor belt, but when the material loss is related to the quantity of food to which the product has been exposed, the potential material loss per unit of food is so minute it could not reasonably be expected to become a component of the food.

After review of such information, the Commissioner may be able to advise the company that in the opinion of the FDA the product is not a food additive. Under the amendment and the regulations this is an "advisory opinion" and not an "approval."

Q. What is the FDA's reaction to companies who have received such advisory opinion and then in publicity and advertising have used such terms as "received FDA approval for sale" or "FDA-approved" products?

A. The FDA has no control over a company's choice of words in publicity and advertising, but, insofar as the phrases you quote indicate that an approval or license is required of FDA, it is a corruption of the meaning and intention of the amendment. Administratively it would be impossible for FDA to review at this time the many thousands of products and their uses that might fall under the scope of the amendment, and, for this reason, encourages companies and industries to rely on their own chemists and scientists in determining compliance.

Q. Some of the companies within our industry making products such as rubber-coated aprons, protective footwear, refrigerator gaskets, etc., have been led to believe they might be involved because of their product's use in the food industry. How can we assure them they need have no concern?

A. In answer to your very first question, I stated that a product is exempt from the amendment if "during the product's use it cannot reasonably be expected to become a component of the food or otherwise affect the characteristics of the food." For the type of products you have just mentioned, they meet this rule and thus are exempt if as their identity indicates they are not used under conditions in which they can reasonably be expected to become components of food. I would not expect any part of a well-formulated rubber apron to become a component of food under the ordinary conditions of use.

Q. If we were to prepare a list of similar products, together with their use, that we believe are exempt under this rule, could FDA confirm our classification?

A. As I have already indicated, FDA would issue an advisory opinion under paragraph 121.3 (d) of the regulations as we have previously discussed.

Q. For the rubber products that come in direct contact with food, manufacturers have made tests to determine if there is any material migration into foods. Does the FDA specify any particular testing procedures or techniques that must be used to make this determination?

A. No. The manufacturer, having knowledge of the materials going into his product and the conditions under which it is used, should be better able to develop test procedures. You have referred earlier to extraction tests. These have been used by other industries to determine and measure material migration into typical simulated food solutions and might be adaptable in your case.

Q. In cases where FDA has already issued advisory opinions on rubber products, is it free to disclose the testing techniques used by the applicant to determine and measure the possible presence of a food additive?

A. Yes. Generally this information can be disclosed, but, of course, we could not disclose confidential compound and test data or reveal any trade secrets. We could disclose the test procedures, but not the test data.

Q. We understand that industries such as can enamel who have worked with this problem for some years have standardized testing procedures. Would it be possible for a small technical committee from our industry to meet with the appropriate FDA staff officials to discuss testing procedures, with the objective of developing a recommended technique that could be used by the rubber companies to determine compliance with the amendment?

A. The FDA will be pleased to cooperate and will arrange for discussions with any such committee you may appoint.

Q. Extraction tests, using a minute sample of the vulcanized rubber compound, have been run in simulated food solutions under conditions considerably exaggerated from normal product use and have demonstrated a material loss from the sample. This material loss can be quantitatively measured, and the migrant into the solution can be expressed in parts per million. With respect to this total material loss, can any tolerance be established as to safety?

A. This question cannot be answered generally. For a cancer-forming substance the law provides for a zero tolerance within the limits of scientific measurement. For certain substances toxicologist might consider one part per million as pharmacologically insignificant, i.e., no migration; for others a higher level might be generally recognized as safe.

The law does not require a manufacturer to petition FDA to establish a safe level of usage except for the addition to food of any substance which within the definition of the law is a "food additive." Upon petition to FDA a regulation may be issued establishing safe usage in terms of limits of extractability for substances which enter food by extraction, i.e., incidental additives.

Q. Now that the Food Additives Amendment becomes fully effective on March 6, 1960, how can a manufacturer supplying rubber products to the food and beverage industry continue to operate?

A. On and after March 6, 1960, a manufacturer is required to comply with the amendment and the regulations. He is responsible for determining if he is in compliance and can be held accountable for violations.

The manufacturer should first determine if he is exempt from the amendment by applying the three tests given in answer to your first question. With respect to prior sanctions or approvals granted before September 6, 1958, the manufacturer may inquire concerning a specific substance. A prior sanction granted to one is applicable to all.

With respect to the "reasonably expected" test, the manufacturer should have the needed information to apply this rule. He knows what his product is made of and how it is compounded and vulcanized. He knows the conditions of use and the types of food and beverage with which it comes in contact. He knows how long the product performs during its use, and

whether it deteriorates, abrades, or otherwise loses material weight. He knows the quantities of food or beverage his product has been in contact with during its life. If it has undergone material loss, he can reasonably compute quantities added per unit of food or beverage. From this knowledge he may be able to estimate whether his product could reasonably be expected to become a component of the food.

In addition to knowledge of his product's performance, a manufacturer could perform the relatively simple extraction tests that are used by other industries and to which you referred in your preceding question. In this situation the manufacturer knows the characteristics of the food or beverage with which his product is used and can select the appropriate simulated food solutions. He can exaggerate the test conditions as to temperature, volume of solution, and immersion time to provide a safety factor compared with normal use. He can determine whether the rubber sample has lost material weight during the test, and, if so, can quantitatively compute the material loss per unit of solution. These results can be translated to normal use conditions. From these tests he should be able to make a decision as to whether his product could reasonably be expected to become a component of the food.

If the manufacturer knows through his knowledge of product performance or by results of tests, such as the extraction test, that a significant quantity of his product is added to food or beverage, he must carry his investigations further to be certain of compliance. He can investigate the ingredients used in making his product and classify them as to safety. He may find it necessary to analyze the extract and classify such substance as to safety. He may find this necessary to test the applicability of the "generally recognized as safe" rule.

While the amendment is basically self-determining and self-policing, a manufacturer who is not equipped to make his decision can, by written request, seek an advisory opinion from FDA. To support such a request the company must supply all the information available to him on the product and its use.

Finally, you may find yourself obligated to satisfy your customers that you are complying with the amendment. You cannot ignore such requests and should be prepared to state unequivocally that your product is either exempt or complies.

You should endeavor to keep up with regulations issued by FDA concerning food additives particularly those affecting the packaging industry and those related to incidental additives.

Stockpiled Rubber Sales To Run Through June; See New Law Certain

Government sales of stockpiled natural rubber will continue on a business-as-usual basis through June, after which time the liquidation program will proceed on a regular basis for the next few years.

Continuation of the sales program beyond June 30 is conditional upon enactment of authorizing legislation before the adjournment of Congress early in the summer. There is little prospect, however, that the request of the Administration to sell off 470,000 long tons of surplus rubber in the national stockpile will be rejected.

"Rotation" Rubber Sales

Continuation of the sales program for the balance of this fiscal year was decided upon by the Administration on March 7. The decision was made because the fiscal 1960 total sale target of "approximately 50,000 long tons" had been practically reached by March 1, and the authorities did not want to halt the sale program until they received a new order to proceed from Congress.

[1]Rubber World, Oct., 1959, p. 111.

The 50,000-ton sales target for 1960 was set last year,[1] when the House Appropriations Committee eliminated the General Services Administration's request for funds to rotate deteriorating rubber stocks. The Committee action, later upheld by the Senate and the House, in effect ordered GSA to sell instead of rotate the 50,000 tons of old rubber.

"Rotation" vs. "Sell-Off" Rubber

Taking its cue from the Appropriations Committee, GSA on September 15 last year announced plans to sell during the next nine years about 470,000 tons of the estimated total of 1.2 million tons in the stockpile. The surplus sales were to commence in fiscal 1961, starting July 1 this year. Sales of deteriorating rubber in the interim period, between last September and next July, were to be made on the authority in the 1960 Appropriation Act to sell in lieu of rotation.

This very complicated timetable was temporarily upset when GSA sold the 50,000-ton fiscal 1960 target some three months before the end of the fiscal year. There were 75,000 tons of rubber known to be obsolescent, hence available for sale under the defunct rotation program, and the market hadn't wobbled the least under the impact of the 50,000-ton sell-off since last October. So the administration gave GSA the green light to continue selling between 8,000 to 10,000 tons monthly during the last quarter of this fiscal year.

"Sell-Off" Awaits Senate

Meanwhile, the House Armed Services Committee approved the overall Administration plan to sell off 470,000 tons between fiscal 1961 and 1968. The legislation was temporarily hung up, however, because of the unexpectedly protracted House debate on Civil Rights legislation. The Senate at the same time was completely immobilized on the rights issue, with no legislative action except for appropriation matters taken.

The legislative log-jam will not last forever, however, and the resounding vote of approval of the long-term sales program given by the House Armed Services Committee is a measure of the popularity of the proposal on Capitol Hill.

The Committee in its report on the sale plan emphasized two aspects of the proposal very attractive to an election-year Congress.

First, it said, the government stands to realize a gross profit of between $25 and $30 million on the sale of the 470,000 tons of surplus rubber, valued at current market prices at about $400 million. The gain would be realized by the appreciated price for rubber since it was acquired, and economies also would result from the savings in handling, storage and rotation costs.

Secondly, the Committee declared that there currently is a shortage of

Record of U.S.A. Stockpile Sales

Sold During Mo. of	For Delivery During Month of 1959			1960					
1959	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
Oct.	1,683	1,905	1,378	830					5,796
Nov.		51	1,299	3,193	2,311				6,854
Dec.			470	934	1,404	4,122			6,930
1960									
Jan.				470	3,494	1,760	3,856		9,580
Feb.					1,149	5,249	6,037	5,961	18,396
Total	1,683	1,956	3,147	5,427	8,358	11,131	9,893	5,961	47,556

natural rubber that will last beyond 1965. It forecast the gap between world consumption and production in 1960 at 56,000 tons. The shortage in 1961 will drop to 35,000 tons, to 29,000 tons in 1962, and widen again in 1963 to 50,000, to 100,000 the following year, and 75,000 tons in 1965. These estimates, it said, reflect the advices of all responsible sources, both within government and in industry.

Another aspect of the Committee's report which should be welcome to rubber buyers was the injunction to the Administration to fully publicize, in detail, its disposal plan. The sometimes grudging release of vital details about disposal operations has been upsetting the highly volatile rubber markets.

Industry-Government Meeting on Exports

Rubber industry executives will be summoned to Washington on June 7 for a brain-picking operation to be performed by Commerce Department foreign trade experts. The object: to find out how to boost exports of rubber and rubber products.

The invitation to the rubber industry is one of a series going out to other industries throughout the country. Executives meet with Department officials for one-day tours of the horizon, touching on the main problems American business faces in the export market. The talks are designed to brief the government with the nature of individual export problems. The information obtained, in turn, is supposed to equip government negotiators with the facts to obtain successfully remedial action by other governments.

The overriding desire of the government to boost overseas sales of American products results from the so-called balance of payments deficits which tends to produce alarming outflows of United States-owned gold stocks.

The payments deficits themselves have occurred every year since 1950 with the exception of 1957. They were painfully large in 1958 and 1959, aggregating more than $7 billion for those two years alone. Deficits are caused when this country pays out for imports, foreign investment, foreign aid, and tourism more than it takes in from exports of goods and services and international debt repayments.

The government has chosen to promote an increase of exports to solve the payments problem rather than moving to restrict imports or the outflow of private capital for investment abroad and public capital for foreign aid. To this end, it has uncorked a widely publicized export promotion scheme calling for an increase in government and business activities aimed at bigger foreign sales of U. S. goods. The chief instrument in the government's effort is the inauguration of a new program to insure short-term credit to protect U. S. exporters and thus enhance business interest in overseas markets.

The conferences with various branches of industry are another aspect of the "Export and Live" campaign. They got off to a bad start when Commerce Secretary Frederick H. Mueller called a kick-off conference of some 160 business leaders in March. The techniques for arousing interest included everything from the sophisticated Madison Avenue approach to good, old-fashioned circus ballyhoo—and it was duly panned in the press.

But the individual industry meetings proved more fruitful. Of the three get-togethers that had been completed by mid-March with representatives of the motion picture, machine tool, and paper products, the government people received a fairly good picture of what these industries want in the export markets, and the businessmen themselves seemed pretty well satisfied that the government understands their problems. What help is forthcoming, if any, will be seen in the outcome of the global tariff negotiations this country will participate in starting next September.

No agenda of business has yet been set up for the rubber producers who will be invited to the June 7 conference, but presumably will be before the invitations are mailed out in April and May.

Chemical and Rubber Spending Up One-Third

According to a joint release of the United States Commerce Department and the Securities & Exchange Commission on March 11, the investment plans of business for 1960 indicate an increase of $4½ billion, or one-seventh over the total for last year. Manufacturing firms are planning outlays of about $15 billion in 1960, compared with $12 billion in 1959 and a high of $16 billion in 1957.

The chemical and rubber industries are expected to increase their expenditures for new plants and equipment about one-third over that spent in 1959. The data given below for 1960 are based on estimates by the industry groups involved and were made during January and February of this year.

NEW PLANT EQUIPMENT EXPENDITURES, 1957-1960

(Millions of Dollars)

Period	Chemicals	Rubber Products
1957	1,724	200
1958	1,320	134
1959	1,235	190
1960	1,642	254
1959, Jan.-Mar.	260	35
1959, Apr.-June	302	45
1959, July-Sept.	310	51
1959, Oct.-Dec.	363	59
1960, Jan.-Mar.	318	52
1960, Apr.-June	358	67

The joint Commerce-SEC release stated that manufacturers expect sales in the non-durable goods industries, which include chemicals and rubber products, to exceed 1959 sales by 6%.

These increases in plant and equipment spending mean more business for the industries supplying the basic materials and equipment, more employment, and more purchasing power, it was pointed out.

FTC Tire Price Fix Case Hearings Begin

One of the biggest price-fixing cases in Federal Trade Commission history opened March 21. On trial was virtually the entire rubber tire industry—15 of the leading companies, The Rubber Manufacturers Association, Inc., and The Tire & Rim Association. The charge, brought last June 12 by FTC, alleged conspiracy in violation of the Federal Trade Law to fix prices.[1]

The first day of hearings in the immensely complicated case was marked by the introduction into the record by FTC counsel of about 1,200 documents obtained from the files of the respondents. Merely to list the documents required a dossier of 140 pages which was introduced into the record.

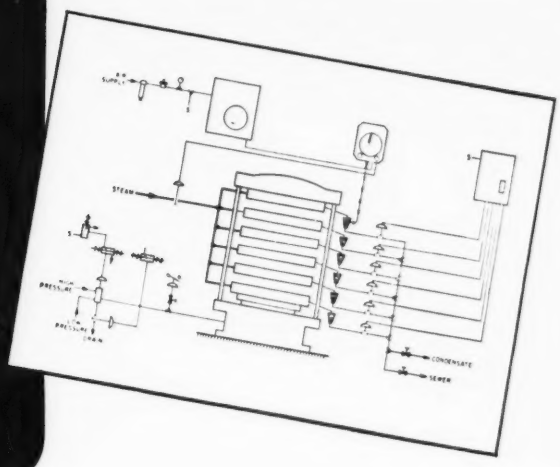
The move touched off a legal haggle that will continue through the proceedings. Rubber company and association attorneys complained that introduction of so weighty a mass of evidence, introduced all at once, would put the burden of proof that they were immaterial, irrelevant, or incompetent upon the respondents. They argued that the FTC itself had the burden of proof to establish them as proper evidence.

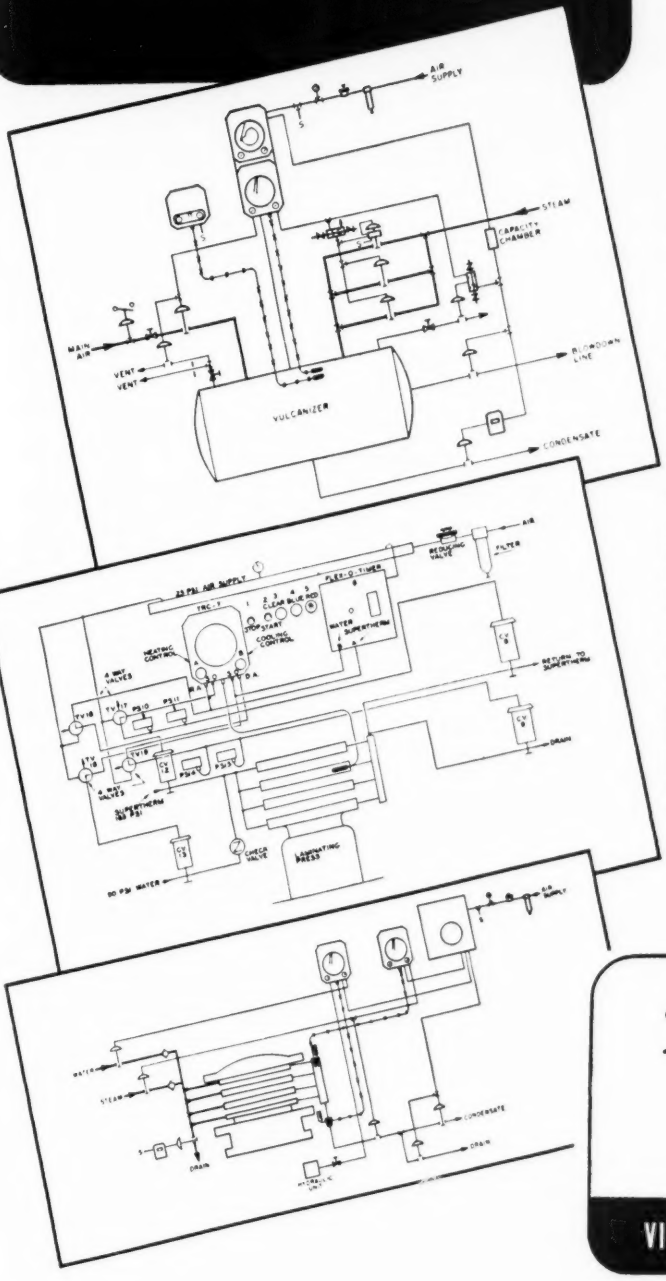
The FTC's counsel, James S. Kelaher, told the hearing examiner, Earl J. Kolb, that the evidentiary material is only phase one of the agency's case against the respondents. He said the documents introduced March 21 bear on market price changes, discounts, and allowances allegedly in violation of the law. Later, he said, FTC will introduce an accounting study which is not yet completed, but which will outline challenged price changes. This evidence, he added, will call for a second round of hearings.

The June 12 complaint of FTC alleges the maintenance of a single-zone delivered price system, agreements on customer classification, list prices, bonuses, and a cost accounting formula maintained by RMA, all of which, if proved, could be found to violate the FTC act. The documents introduced on the opening day of the hearing include such data as letters to dealers and others, memos relating to rumored price changes by other companies, and other documents on inter-industry communications.

[1] RUBBER WORLD, July, 1959, p. 596.

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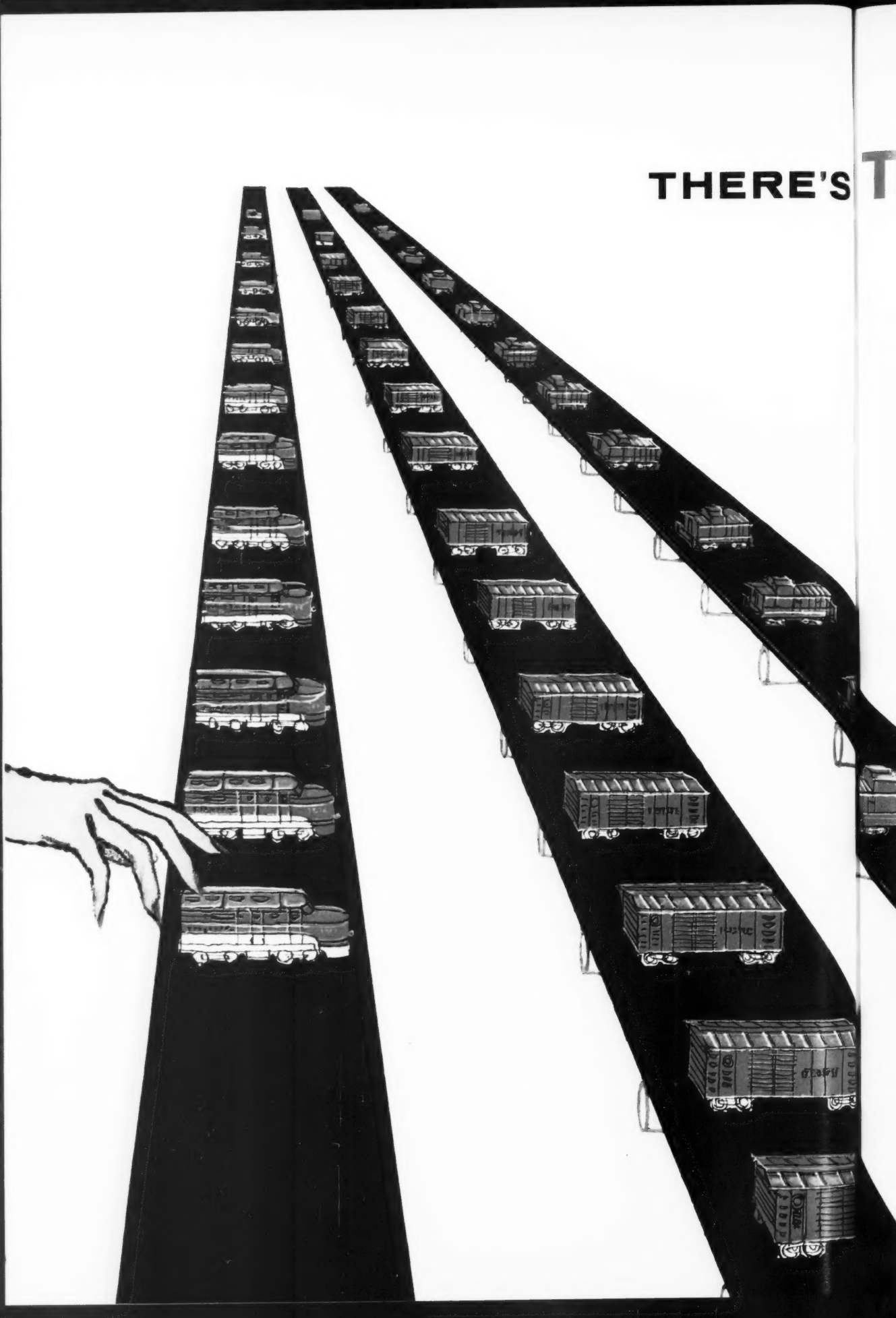
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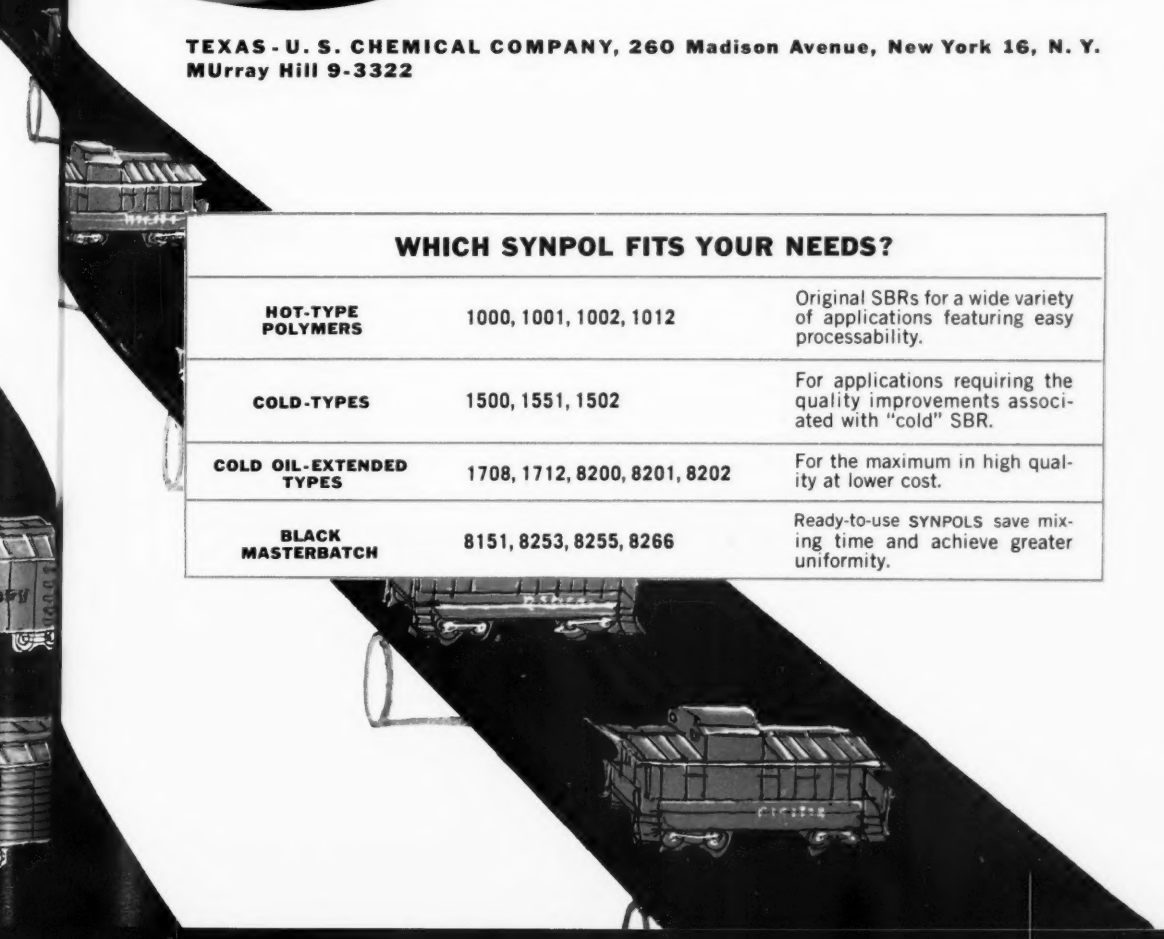
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First 1958 Census of Manufactures Footwear, Reclaim Figures Issued

TABLE 1. GENERAL STATISTICS FOR THE RUBBER FOOTWEAR INDUSTRY IN THE UNITED STATES: 1958 AND 1954

(Standard Industrial Classification Code 3021)

Item	1958*	1954*	% Change 1954 to 1958
All employes			
Number	20,400	18,300	+11
Payroll	$85,600,000	$64,000,000	+34
Production workers			
Number	17,600	15,800	+11
Manhours	34,100,000	30,300,000	+13
Wages	$68,600,000	$51,300,000	+34
Value added by manufacture, unadjusted†	$146,700,000	$107,000,000	+37
Adjusted‡	$149,600,000	$106,800,000	+40
Cost of materials, fuel, electricity, and contract work§	$81,700,000	$63,700,000	+28
Value of shipments¶	$229,400,000	$171,500,000	+34
Capital expenditures, new	$3,100,000	$4,200,000	−26
Number of establishments with 20 or more employes‖	26	21	+24

* The figures in this report include the results for establishments located in the continental United States. Since Alaska and Hawaii were not states until 1959, they will be covered in separate reports.
† Value of products shipped less cost of materials, supplies, fuel, electricity, and contract work.
‡ Adjusted value added by manufacture is the sum of (a) unadjusted value added, plus (b) the difference resulting from the purchase and resale of products without further manufacture, processing, or assembly, plus (c) the net change in finished products and work-in process inventories between the begining and end of year.
§ Includes cost of products bought for resale without further manufacture, processing, or assembly.
¶ For explanation see text on value of shipments.
‖ Except for "Number of establishments with 20 or more employes," the figures shown in the table are based on reports for all establishments (including those with less than 20 employes) classified in the industry.

Some advance information from the 1958 Census of Manufactures for the rubber industry has become available with the publication of "Industry and Product Reports" for rubber footwear and the reclaimed rubber industry, MC(P)-30A-1 and MC(P)-30A-3, respectively, dated February, 1960, available at 10¢ each from the Bureau of Census, Washington, D. C., and United States Department of Commerce field offices.

Rubber Footwear

During 1958, manufacturers in the rubber footwear industry shipped products valued at $229.4 million, an increase of 34% over the 1954 figures; average employment increased 11%; and value added by manufacture totaled $149.6 million in 1958. Value added by manufacture is derived by subtracting the cost of materials, fuels, etc., from value of shipments, and this figure avoids the duplication in the value of shipments which results from the use of products of some manufacturing establishments as materials by others and is for most purposes the best value measure available for comparing relative economic importance of manufacturing industries or geographical areas, according to the Bureau of Census of the Department of Commerce. In the tabulation shown in Table 1 no adjustments were made in the money figures shown for the changes in price levels from 1954 to 1958.

The value of shipments reported by establishments classified in the rubber footwear industry ($229.4 million) consisted not only of products described as primary to the industry ($192.9 million), but also included the value of secondary products (which are primary in other industries) ($25.5 million), and miscellaneous receipts for contract work, resale of products, etc. ($11.0 million). The industry shipments of primary products in 1958 represented 88% of the total manufactured product shipments (primary and secondary), as compared with the 1954 ratio of 84%.

The total value of shipments for the industry, which is the total value of receipts of establishments classified in the industry, should be clearly distinguished from the total value of primary products of the industry shipped by all producers. The latter figure, which appears in Table 2, indicates that $213.6 million of rubber footwear were shipped by all producers of these products. Of this total $192.9 million, or 90%, were shipped by plants classified in Industry 3021, Rubber Footwear; while the remainder was shipped by plants classified in other industries.

Reclaimed Rubber

In 1958 reclaimed rubber manufacturers shipped products valued at $39.3 million, a decrease of 38% from the value in 1954; average employment decreased 27% from 1954 to 2.2 thousand employees in 1958; and value added by manufacturers amounted to $20.9 million, a decrease of 11% from the 1954 figure, as shown in Table 3.

The value of shipments reported by establishments classified in the reclaimed rubber industry ($39.3 million) consisted not only of products described as primary to the industry ($35 million), but also included the value of secondary products ($2 million), and miscellaneous receipts for contract work, resale of products, etc. ($2 million). The industry shipments of primary products represented 94% of the total manufactured product shipments (primary and secondary) in 1958, as compared to the 1954 ratio of 87%.

The total value of shipments for the industry, which is the total value of receipts of establishments classified in the industry, should be clearly distinguished from the total value of primary products of the industry shipped

TABLE 2. QUANTITY AND VALUE OF RUBBER FOOTWEAR SHIPPED BY ALL PRODUCERS IN THE UNITED STATES: 1958 AND 1954

(Includes quantity and value of these products reported not only by establishments classified in the Rubber Footwear Industry, but also by establishments making these items as "secondary" products in other industries. See text on value of shipments.)

Product Code	Product	1958 Total Production (1,000 Pairs)	1958 Total Shipments Including Interplant Transfers Quantity (1,000 Pairs)	1958 Total Shipments Including Interplant Transfers Value ($1,000)	1954 Total Production (1,000 Pairs)	1954 Total Shipments Including Interplant Transfers Quantity (1,000 Pairs)	1954 Total Shipments Including Interplant Transfers Value ($1,000)
3021	Rubber footwear, total	*	*	213,634	*	*	163,730
	Canvas						
3021011	Bals	20,392	19,855	42,821	15,406	14,969	31,148
3021013	Oxfords	40,717	39,999	72,114	25,451	25,758	48,352
3021015	Specialty shoes	10,300	10,147	20,339	10,250	10,217	19,720
	Waterproof						
3021021	Boots	3,014	3,009	14,347	2,060	2,152	11,219
3021031	Lumberman and pacs	1,691	1,672	10,277	1,670	1,702	9,411
3021041	Arctics and gaiters						
	Buckle and automatic, except style	6,500	6,914	24,004	4,821	5,370	16,003
3021045	Style, rubber and cloth	6,011	6,503	15,124	6,919	7,253	16,540
3021051	Light and heavy rubbers	8,221	8,371	12,998	7,664	8,340	11,337
3021098	Other rubber footwear	374	373	1,610	....	....	....

* Not applicable.

TABLE 3. GENERAL STATISTICS FOR THE RECLAIMED RUBBER INDUSTRY IN THE UNITED STATES: 1958 AND 1954

(Standard Industrial Classification Code 3031)

Item	1958*	1954*	% Change 1954 to 1958
All employes			
Number	2,200	3,000	−27
Payroll	$11,700,000	$12,700,000	− 8
Production workers			
Number	1,800	2,500	−28
Manhours	3,300,000	4,600,000	−28
Wages	$9,100,000	$9,700,000	− 6
Value added by manufacture, unadjusted†	$20,700,000	$22,000,000	− 6
Adjusted‡	$20,900,000	$23,500,000	−11
Cost of materials, fuel, electricity, and contract work§	$18,500,000	$40,100,000	−54
Value of shipments¶	$39,300,000	$63,600,000	−38
Capital expenditures, new	$1,000,000	$2,800,000	−64
Number of establishments with 20 or more employes‖	14	18	−22

* The figures in this report include the results for establishments located in the continental United States. Since Alaska and Hawaii were not states until 1959, they will be covered in separate reports.

† Value of products shipped less cost of materials, supplies, fuel, electricity, and contract work.

‡ Adjusted value added by manufacture is the sum of (a) unadjusted value added, plus (b) the difference resulting from the purchase and resale of products without further manufacture, processing, or assembly, plus (c) the net change in finished products and work-in process inventories between the beginning and end of year.

§ Includes cost of products bought for resale without further manufacture, processing, or assembly. In 1958, cost of these resales amounted to less than $1 million compared to $23 million in 1954.

¶ Includes resale of products amounting to approximately $1 million in 1958, compared with $25 million in 1954. For further explanation see text on, value of shipments.

‖ Except for "Number of establishments with 20 or more employes," the figures shown in the table are based on reports for all establishments (including those with less than 20 employes) classified in the industry.

the United States tax on foreign-source income of American companies, got to the House floor, but no farther.

Bike Tire Bill Veto Likely

The bike tire and tube tax relief bill faces a possible Presidential veto. The Treasury Department, ever watchful of legislative measures which cut down federal revenues, may recommend a veto since it opposed the measure on grounds it would cost the government $500,000 a year in excise tax collections.

Boggs Bill Opposed

A storm of opposition against the proposed "Foreign Investment Incentives Act" sponsored by Rep. Hale Boggs (Dem., La.) stopped the measure cold. Boggs withdrew the bill during debate rather than risk a vote that would defeat it. Even if he can successfully maneuver it through a House vote later this session—and he says he will have it called up again when the House finishes its debate of a Civil Rights bill—a closely contested vote on House passage will seal the bill's doom in the Senate, which has yet to consider it.

The Boggs bill had been of interest to a number of the larger United States rubber manufacturers with networks of subsidiaries and affiliates overseas. The main feature of the bill would permit U. S. firms to reorganize their corporate structures, tax-free, in order to establish "Foreign Business Corporations." These FBC's, which would handle all the American parent firm's foreign business operations, could defer payment of U. S. corporate taxes until their foreign earnings were repatriated for distribution in this country. The objective of the legislation is to induce U. S. companies to re-invest foreign earnings in still other countries.

Boggs had a tough time with the measure in the House Ways and Means Committee, which scrutinized the bill for more than a year. When the Com-

by all producers. The latter figure, appearing in Table 4, indicates that $48 million of reclaimed rubber and crumb or ground rubber were shipped by all producers of these products. Of this total $35 million of all reclaimed rubber, or 74%, were shipped by plants classified in Industry 3031, Reclaimed Rubber; while the remainder was shipped from plants classified in other industries.

TABLE 4. QUANTITY AND VALUE OF RECLAIMED RUBBER SHIPPED BY ALL PRODUCERS IN THE UNITED STATES: 1958 AND 1954

(Includes quantity and value of these products reported not only by establishments classified in the Reclaimed Rubber Industry, but also by establishments making these items as "secondary" products in other industries. See text on value of shipments.)

Product Code	Product	1958 Total Production (1,000 Lb.)	1958 Total Shipments Including Interplant Transfers Quantity (1,000 Lb.)	1958 Total Shipments Including Interplant Transfers Value ($1,000)	1954 Total Production (1,000 Lb.)	1954 Total Shipments Including Interplant Transfers Quantity (1,000 Lb.)	1954 Total Shipments Including Interplant Transfers Value ($1,000)
3031	Reclaimed rubber, total	*	*	47,646	*	*	44,542
3031011	Reclaimed rubber†	582,568	496,930	47,123	569,058	501,013	43,734
3031051	Crumb or ground rubber‡	14,197	10,030	523	13,555	7,935	808

* Not applicable.

† Any vulcanizable material, except reclaimed residue or "mud" derived from processing or treatment of material or synthetic (chemical) vulcanized scrap rubber.

‡ Grindings of scrap not devulcanized by the pan or digester process.

Seek Other Black Freight Rate Cuts

Striking while the iron is hot, rubber industry representatives bargaining for lower freight rates on carbon black shipments hope to follow up their success in getting lower tariffs for all eastern and northeastern destinations, with similar rate reductions on shipments to southeast and western destinations.

The talks in Little Rock, Ark., with southern and western carriers will be pursued by the Rubber Manufacturers Association's traffic committee over the next few months. RMA Traffic Committee Chairman George Gwinup hopes the talks will produce reductions similar to those approved February 29 for the East and the Northeast. The cuts average about 20% per hundredweight. Estimated transportation cost savings to producers in the affected areas are expected to exceed $1.5 million. For carbon black producers who cooperate with RMA through the National Gas Products Association the benefits will be greater.

The rate cut for the East and the Northeast was upheld by the Interstate Commerce Commission on February 29. ICC approved the reductions by throwing out the appeals of competing carriers for a suspension of the lower rates.

The ICC order, which successfully capped a two-year campaign by the RMA traffic committee, followed similar orders upholding similar reductions made in the southwest territory last December.

Bike Tire Bill Passed; Boggs Bill Opposed

Two tax bills affecting the rubber industry advanced in March. One, to repeal the excise tax on original-equipment bicycle tires and tubes,[1] was passed by the Senate and sent to President Eisenhower for his signature; and the other, the so-called Boggs bill to ease

[1] RUBBER WORLD, Mar., 1960, p. 852.

mittee finally approved the bill and sent it to the floor for debate in mid-March, the Committee tacked on so many restrictive amendments that Boggs almost decided to scrap the whole effort. The most restrictive amendment added in Committee would deny the tax deferral privilege to any FBC which reexports to the United States more than 10% of its foreign production.

The Louisiana Democrat decided that, restricted though the bill was, it was worthwhile to establish the principle of tax deferral on foreign income in the hope that its application could be liberalized by other legislation later.

The attack on the measure during floor debate was sparked by a curious alliance of professional tariff protectionists, ultra-liberal northern Democrats, and Republican supporters of the Administration. The first group took the line that new foreign investment incentives would amount to the "exportation of American jobs." The Democratic liberals' attack reflected the attitude of organized labor — the AFL-CIO circulated a statement against the bill just before the House battle began. The Administration Republicans attacked it on grounds it lacked the revenue safeguards which the Treasury insisted were necessary to make the bill acceptable to the Administration.

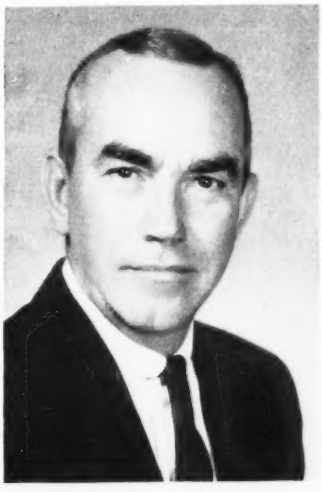
INDUSTRY NEWS

Cabot Announces New Oil Furnace Blacks

A new family of oil furnace carbon blacks has been announced by Godfrey L. Cabot, Inc., Boston, Mass. Carrying the trade-marked name, Regal, the new blacks were developed by Cabot's research and development department and will be produced in all of the company's plants throughout the world.

The first three members of this new carbon black series are designated Regal 300, Regal 600, and Regal SRF, according to the announcement made by Owen J. Brown, Jr., vice president and director of sales. Even though the Regal SRF can be classified as a semi-reinforcing furnace black, Regal 300 and Regal 600 are enough different from existing blacks that they cannot be listed under existing classification systems.

This new series of blacks makes it possible to duplicate the performance characteristics of gas furnace SRF and channel blacks and to provide properties not previously available from either gas or oil produced furnace blacks. It is reported that the Regal blacks are lower in structure, exhibit lower modulus, lower hardness, and higher elongation than the HAF, ISAF, and SAF types of oil furnace blacks. In fact, the report states that the modulus can be lowered hundreds of pounds, but the grades selected were purposely chosen to match the levels of gas furnace SRF and EPC and to provide the best compromise among tread wear, economy, dispersion, and other properties. To substantiate these claims Cabot engineers have logged a total of 3,000,000 tire miles in road tests, using compounds containing these new blacks.



Owen J. Brown, Jr., announces a new family of Cabot carbon blacks named Regal

The economic significance of this development to the rubber industry in the United States and abroad is explained by pointing out that since these blacks will be available worldwide from Cabot plants, they can be purchased in local currencies. These purchases will mean that consumers overseas will not have to import gas SRF and channel blacks in exchange for American dollars. This availability should also have an effect upon the relative price stability, both in the U. S. and abroad, of oil-made blacks, as compared with blacks made from natural gas. With shortages threatened in the supply of natural gas and resulting rises in prices, a source of carbon blacks not dependent upon natural gas should assure an uninterrupted supply. Locations not having natural gas supplies will also be able to assure adequate carbon black supplies.

Technical information on the three grades being furnished at the present time may be found in the New Materials section of this issue or in technical bulletins available from Cabot.

Improved Quality Kel-F Stocks from Vernay

Elastomer components for electronic, missile, and automotive applications that exhibit excellent dielectric properties, resist high temperatures, and are corrosion resistant have been developed from Kel-F 3700 halofluorocarbon elastomer by means of a special peroxide cure by Vernay Laboratories, Inc., Yellow Springs, O. Applications of this elastomer, made by Minnesota Mining & Mfg. Co., St. Paul, Minn., include high-temperature electrical insulation, and as hose seals diaphragms, fuel cells, and systems using fuming nitric acid and other corrosive media.

One of the potential applications of the elastomer is in rocket engine O-ring seals because of its excellent resistance to red fuming nitric acid (RFNA), white fuming nitric acid (WFNA), and jet fuels JP4 and JP5.

Tests of the Vernay-processed Kel-F 370, conducted by 3M, revealed that the peroxide-cured material had only a 16% volume change when exposed to RFNA and WFNA, an elongation change of from 400 to 390%; while Shore A hardness changed from 60 to 50 (for RFNA) and 54 (for WFNA). The original tensile strength of 3,500 psi. changed to 2,380 psi. with RFNA, but WFNA reduced this figure to 480 psi. In a compression set test of 22 hours at 30° F., the ASTM value was 45%.

In one application in subminiature electrolytic capacitors, the elastomer withstood temperatures as high as 200° C. during exposure to 40% sulfuric acid. In a porous tantalum capacitors potting application, Vernay-processed Kel-F 3700 provided absolute sealing and insulating qualities, it was said.

Thermal stability of this fluoroelastomer results from the 50% fluorine content. Adaptable to molding and extrusion of even the smallest components, Kel-F 3700 is processable on conventional equipment.

Thomas and DeYoung Receive NBP Award

E. J. Thomas, chairman of the board, and Russell DeYoung, president of the Goodyear Tire & Rubber Co., Akron, O., received the first Silver Scepter award of the National Business Publications as "Market Makers of the Year" at the association's annual spring meeting at Boca Raton, Fla., on March 9.

DeYoung, acting on behalf of himself and Board Chairman Thomas, said that American businessmen need more information about the foreign markets in which they are operating. He mentioned the new $39-million tire plant and $42-million tire fabric plant being built by the Russians as examples of their means for providing improved products with which this country will be competing abroad. We have an advantage that the Russians may not equal for a long time, however, and that is our greater ability as merchandisers, he added.

Closer contacts between publishing executives and executives of the industries they serve were urged in order that publishers could acquire an intimate awareness of the problems of men and companies in their industries.

The Goodyear president suggested that NPB provide a simplified digest of significant stories in its business publications for the youth of the nation. He suggested also that the business press do a more comprehensive job of reporting for American industry the technical developments and new ideas being used by foreign competitors as a contribution to the success of the manufacturing industry in this country.

The NBP announced that it will present the Silver Scepter award annually at its annual spring meeting. Goodyear's two top executives were cited for their efforts in "sustaining and expanding that organization's far-flung world markets through comprehensive utilization of a full marketing concept."

Air-Bag Cushions B-70 Escape Seat

An air-filled rubber bag that cushions the landing of an escape capsule from North American Aviation's B-70 bomber has been successfully tested in Air Force survival emergency tests conducted near California's Salton Sea. The rubber bag, called an impact attenuator, was developed and manufactured by B. F. Goodrich Aviation Products, a division of the B. F. Goodrich Co., Akron, O.

As the B-70's individual encapsulated seat hits the ground, after being rocketed and parachuted under emergency conditions, the air-inflated rubber bag on the bottom of the seat absorbs the first sudden impact, but immediately ejects its air pressure so that the flier and his escape capsule do not bounce.

The bag is a specially constructed air container using a combination of rubber and fabric that is lightweight, yet capable of withstanding shock and impact when the capsule hits rugged terrain, reports Goodrich. The survival unit, equipped with a nylon parachute, provides an airtight seal in emergencies and eliminates the need of oxygen masks or other portable survival gear. Each of the four B-70 crewmen has his own individual encapsulated seat.

The new-type escape unit carries 45 pounds of survival gear, radio equipment for distress and guidance signals, and will protect Air Force flyers landing in remote areas.

Edenville Shore "A" 10 Silicone Rubber

Edenville Plastics, Inc., Warwick, N. Y., is producing a silicone rubber compound #3490-A with Shore "A" durometer of 10 to meet the demand for a gasketing material in aircraft components that will distort with a minimum of back pressure and seal effectively. Prior silicone rubber stocks in this durometer range exhibited poor compression set and hardened beyond specification range during high-temperature oven-aging tests.

Additional uses include laminating and heat sealing platen cushions and door gasketing for either high or low temperature.

The material is available from the company in sheet form, up to 14 by 21 inches in thicknesses of 1/32-inch through 1/4-inch. This compound can be supplied in molded or die-cut form to size.

Some reported test data as follow:

Tensile strength, psi. (ASTM Method D 412)	525
Elongation, %	625
Compression set (def. 40% of orig.) 70 hrs. @ 300° F., % (ASTM Method D 395 "B")	29
Heat aging (ASTM Method D 865)	
Hardness change, 24 hrs. @ 450° F., durometer points	0
70 hrs. @ 350° F.	0
Low temperature—pass @ −130° F. (ASTM Method D 736)	OK

ASTM Committee E-17 On Skid Resistance

A new approach to skid-resistance measurement—use of standard surfaces of known slipperiness—will be attempted by a new ASTM committee, E-17 on Skid Resistance. At the first meeting of the steering committee, held in Washington, D. C., December 16, the chairman *pro tem*, A. T. Goldbeck, National Crushed Stone Association, reviewed the story behind the proposed formation of the committee, starting with the International Conference on Skid Prevention held in 1958, which revealed a need of standardization of equipment and test methods used in measuring skid resistance of pavement surfaces.

The committee's primary task will be to develop standard test vehicles and standard surfaces for calibration purposes. The scope proposed by the steering committee includes: (1) to develop and standardize field and laboratory for determining traffic surface slipperiness; (2) to develop and standardize methods of test for the use of a set of standards of surface slipperiness; and (3) to stimulate research to accomplish objectives (1) and (2).

The list of organizations that have been invited to participate in the activities of the new committee includes highway departments, universities, The Tire & Rim Association, Inc., the National Bureau of Standards, and the National Safety Council. It is hoped that the Highway Research Board will be able to stimulate much of the needed research, and that the Bureau of Public Roads will be among the organizations that will undertake the necessary field work.

The organization meeting of the committee will be held during the ASTM annual meeting in Atlantic City, N. J., June 26-July 1. Parties which are interested in participating in the committee's activities should write ASTM headquarters, Philadelphia, Pa.

New FMC Chemicals Research Center

Food Machinery & Chemicals Corp.'s chemical research and development center at Princeton, N. J., has been completed on schedule and now is fully staffed with 200 people, reports Carl F. Prutton, executive vice president.

In addition to research personnel, the center houses inorganic product application and sales service groups formerly associated with FMC's Becco Chemical, Chlor-Alkali and Mineral Products divisions, as well as FMC's chemical patent department. A unique feature of the center is its specially designed pilot-scale areas for extended studies in textiles, pulp and paper, detergents, metals, and other fields.

An organic group performs research and development assignments for the Niagara Chemical and the Chemicals & Plastics divisions. This work includes research in polymer applications and functional fluids. Work of a general analytical nature, related to all five FMC Chemical Divisions, is performed by a central group, which also carries out statistical and engineering studies.

Copolymer Expansion

The Copolymer Rubber & Chemical Corp., Baton Rouge, La., expects to begin a $5-million expansion of its butadiene plant within five months, bringing its total current expansion to an excess of $8 million. Completion of the project by May, 1961, will result in a 50% increase in the company's butadiene production, according to Paul G. Carpenter, executive vice president and general manager.

This newest expansion will enable Copolymer to supply all of its requirements for butadiene, one of the principal ingredients of the type of synthetic rubber produced by Copolymer. The building program, which totals $3 million, is aimed at meeting trade demands for "Carbomix" rubber, an SBR-carbon black masterbatch.

The building project also includes construction of a 95,000-square foot warehouse and further enlargement of pilot-plant facilities employed by the Copolymer research staff. When the company's current expansion program is completed, the firm's total plant capacity will reach 125,000 tons of rubber per year.

The story was released by H. P. Schrank, member of the Copolymer board and executive vice president of Seiberling Rubber Co., one of the seven rubber companies that purchased the Copolymer plant from the government in 1955.

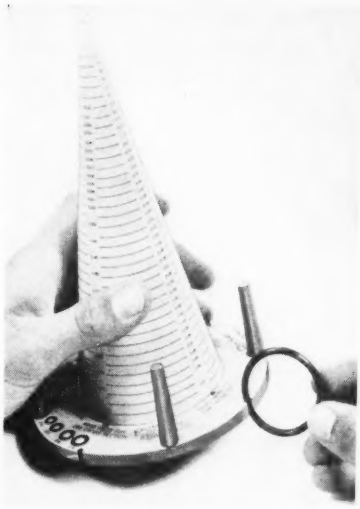
Parker "Viton" O-Rings

"Viton" O-rings in all ARP (AN & MS) sizes as standards are now being offered by Parker Seal Co., Culver City, Calif., as a result of an intensified tooling and development program. The program also makes possible finer dimensional control and better O-ring qualities heretofore not possible in "Viton" with regular molds and processing methods, reports the firm.

Sizes offered cover all "Viton" compounds, and plans call for stocking the most popular sizes in 93 cities for immediate delivery. Other sizes will be available for fast delivery through stocking and fabricating procedures at any of the company's five plants through eastern offices in Cleveland, O., or Culver City offices.

Complete information, data, and dimensions are contained in a special booklet available from the company.

Parker has also announced the development of a visual O-ring size gage (see illustration) which enables O-ring users to check I. D. and cross-section of O-rings without manual or mechanical measuring. The gage consists of a single-unit cone base with adjustable cross-section measuring strip. The cone is mounted on a slotted base. The I. D. of the O-ring is measured by placing the O-ring on the cone, while the



Parker O-ring size gage

cross-section is measured with slots in the base. Proper relation of Parker Seal 2 series or ARP (AN) sizes can be checked by reading the vertical column on an adjustable strip.

These simplified O-ring size checkers are available from the firm's distributors.

"Hypalon" Price Cut

Price cuts for "Hypalon" synthetic rubber ranging from 10 to 23¢ a pound according to type were effected March 1 by the elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The new prices are: "Hypalon" 20, 47¢ a pound; "Hypalon" 30, 60¢ a pound; and "Hypalon" 40, 50¢ a pound.

The three types of "Hypalon" available commercially share a combination of properties such as lasting colorability, resistance to weathering and oils, and resistance to ozone and chemicals. These "Hypalons" can be used at operating temperatures up to 300° F. and have flame resistance comparable to that of neoprene.

"Hypalon" 20 is used extensively in white sidewall tires and in a variety of molded and extruded mechanical goods. "Hypalon" 30, a solution-type material for protective and decorative coatings and paint bases, is used principally for protective and anti-corrosive coatings for industry and decorative coatings for automobile headliners, acoustic wall covering, and a variety of consumer products.

"Hypalon" 40, introduced commercially last May, has received broad attention because of its improved physical properties and processing characteristics, reports Du Pont. This "Hypalon" is being used in a host of conventional rubber products. It is expected to develop important new applications where thermoplastics have been used, such as colored curtain wall gasketing, coatings and panel finishes, and consumer products.

O'Sullivan Realinement

O'Sullivan Rubber Corp., Winchester, Va., whose 1959 volume of business was the largest in its history, has announced a number of changes in organizational structure to facilitate its continuing growth.

These changes, which are not in the nature of a reorganization *per se*, are designed to streamline further the firm's operational efficiency. All manufacturing and sales functions of O'Sullivan's rubber division are assumed by Charles A. McKenney, Jr., vice president and general manager. Manufacturing and sales functions of the firm's plastics division are under the supervision of C. Robert Creamer, Jr., also a vice president and general manager. Sales of O'Sullivan products to the retail shoe trade remain the responsibility of B. B. Wright, president of O'Sullivan Rubber Sales, Inc., a wholly owned subsidiary.

R. C. Evans, who has been engaged in O'Sullivan's plastics research program since 1947, has been named director of research for the firm. Dr. Evans' promotion was announced by Paul Terretta, company president.

Patent Abstract Firm

Patent Intelligence File Co., New Haven, Conn., effective April 1, initiated a day-to-day service in which it will supply any of the two million patent abstracts on 7- by 10-inch three-hole-punched loose-leaf sheets. These copies will be exactly as published in the United States Patent Office Official Gazette over the past 40 years. On a free service account basis, the firm will watch currently and search back year art for patent intelligence ordered by: patent numbers, inventor and company names, classes and sub-classes or types of patents. A small standard price is made for each abstract supplied. Patent idea files can now be secured and maintained on any subject or phase of that subject for interested parties.

Another division of the firm, World Abstract and Idea Exchange, will serve in a similar way. Abstracts on some 300 to 400 subjects of world knowledge (arts, science, industry, government, etc.) will be submitted by members on 7- by 10-inch sheets. The abstracts are to be screened by a specialist for each subject so that only new and progressive ideas may be copied for mailing to members registered for a specific subject or subjects.

Literature on both divisional activities is available from the company.

Dow to Make Nylon 6

Plans for the construction of a plant to manufacture nylon 6 at its James River division, Williamsburg, Va., have been announced by The Dow Chemical Co. The multi-million dollar plant will have an initial capacity of 12 million pounds per year of filament yarn, primarily for use in tire manufacture.

Construction started in March, and completion of the plant is slated for late 1961. The basic consideration in the decision to make nylon 6 was to take advantage of a market potential now developing, especially for tire yarn and other coarse filament yarns, reported Leland I. Doan, Dow president. It is expected that the company's textile fibers department organization, headquartered at James River, will be expanded to handle marketing of nylon 6 in addition to Zefran acrylic staple fiber.

Caprolactam, the principal raw material used in the production of nylon 6, will be obtained from Dow Badische Chemical Co., a Dow associated company with facilities in Freeport, Tex.

Molded Shoe Machines Gaining Acceptance

The impact of the acceptance of direct molded footwear[1] machines in the United States has prompted one of the machine suppliers to expand its operation to give improved sales and services to its customers. Randolph Machine Co., Inc., Randolph, Mass., has realined its executive staff in order to provide these improved services. Heading the new staff will be Julian S. Weinstein, who was elected president of Randolph. Frank Remmes continues as general sales manager, and Joseph Weinstein as director of sales.

Randolph Machine Co. represents AB Svenska Skolast Fabriken of Jarrestad, Sweden, in the United States and Canada. The Skolast machine "Goliath" is a high-pressure molding, vulcanizing press for footwear which is receiving much attention in this type of shoemaking. The machine is described by Mr. Weinstein as being a very long-lasting one made of the finest Swedish steel and workmanship. The machine features split lasts, electrically heated for fast curing and for easy relasting if necessary. It can also be used to make microcellular soling.

A pilot plant is in operation continuously at Randolph for demonstrating the machine, and Swedish trained technicians are available for instruction and servicing.

Mr. Weinstein, a veteran of 20 years' experience in the leather and rubber footwear industries, further stated that direct molded vulcanized footwear is causing a revolutionary change in shoe processes that reminds him of the drastic change that the cement process made many years ago.

[1] RUBBER WORLD, Dec., 1959, pp. 375-382; Jan., 1960, pp. 520-525.

New Sun Toy Agents

The Sun Rubber Co., Barberton, O., has named seven of the toy industry's top manufacturer's agents to handle the complete line of Sun dolls and playthings for 1960. The firm's sales organization has been set up to provide maximum sales coverage to all categories of the toy trade in the United States and Canada, according to W. Earle Henderson, sales manager. The agents selected have outstanding reputations and a broad background of experience.

For the past few weeks Sun has been conducting sales meetings with the new agents. The latter have been thoroughly briefed on the Sun sales and advertising program for 1960 and supplied with complete samples of the line as well as catalogs, price lists, and other sales literature. Actual sales began March 1.

T. W. Smith, Jr., Sun president, reports that Sun's "Golden Line" of dolls, character toys, and playballs for 1960 is the finest array of products in the firm's history. The entire line is being presented in all-new packaging developed after months of intensive market research. Every package is designed to catch the customer's attention and create greater impulse sales. Sun's line is designed to afford the right kind of profit and turnover at all levels of trade.

Arkansas Plant For Ohio Rubber Co.

The Ohio Rubber Co., a division of The Eagle-Picher Co., plans to begin immediate construction of a new plant at Fort Smith, Ark., scheduled for completion around February 1, 1961. The new plant, initially employing some 250 people, will be 190,000 square feet in area and will cost around $3 million. Its design will permit prompt and economical expansion expected at a later date.

The plant will combine the newest engineering and manufacturing concepts in the mechanical rubber goods industry, according to Milo J. Marsh, president of Ohio Rubber. The new facility will initially manufacture automobile floor mats; molded precision rubber parts for automotive, oil field, and general industry; and semi-pneumatic tires for industrial, agricultural implement, and other applications.

The Fort Smith plant will implement Ohio Rubber's policy of providing its customers with fast service and conveniently located facilities for technical assistance and product research and development. The new location is near large automobile assembly plants, is well situated to supply the growing needs of the petroleum industry, and is in a strategic position to participate in the rapid industrial expansion of the South and the Southwest.

To Up "3-T" Output

A $2.5-million facility for the expansion of "3-T" tire fabric production at the Goodyear Tire & Rubber Co.'s Cartersville, Ga., plant was recently announced by Sam DuPree, vice president of production. The new unit will require an approximate 60% increase in the size of existing building facilities.

Unlike earlier units for production of the airtight, tempered fabric, the new installation will combine dipping and stretching of cord into a single operation, resulting in one of the strongest tire cords. Approximately 100 yards of fabric per minute will be produced and processed through a three-story machine which subjects fabric to tons of tension at electronically controlled temperature and for a specific period of time.

Engineering work on the building addition to house the complex unit is now being completed; while the unit itself is in the process of manufacture, reports Goodyear. It will be in operation early next year.

USA Buys Hose, Fabric Tanks from Goodyear

The sale of more than 35 miles of hose to the U. S. Army Quartermaster Corps was recently announced by The Goodyear Tire & Rubber Co., Akron, O., with the transaction described as part of a $2-million contract whereby Goodyear is to supply hose and various other components.

The company will assemble these with huge, rubber-coated fabric, fuel storage tanks to form 93 portable, 60,000-gallon fuel supply systems. The fuel would be dispensed to land-based vehicles and aircraft in forward areas.

According to R. E. Mercer, manager of Goodyear hose sales, each of the giant systems comprises six 10,000-gallon, collapsible fabric storage tanks interlinked by a network of hose and containing special pumping equipment. Under the contract, Goodyear is responsible for the procurement, fitting, and assembly of some 200 components for each system.

The tanks are being supplied under a separate contract by two manufacturers, one of which is Goodyear's Aviation Products Division.

Committee D-11 Assigns Three New SBR Numbers

DESCRIPTION OF TYPES OF STYRENE-BUTADIENE (SBR) ELASTOMERS—ASSIGNMENT OF NEW CODE NUMBERS—ASTM D-11 D 1419-56T

Number as assigned	1510	1607	1808
Date assigned	2/15/60	2/23/60	2/12/60
Requested by	Godyear Tire & Rubber Co.	Shell Chemical Co.	Shell Chemical Co.
Distinctive feature	low Mooney	10 phr. of oil	HAF black-high oil
Close previous number, if any	1508	1804	OB-114-C
Type	1500	1600	1800
Nominal temperature, ° F.	43	43	43
Activator	FRA	FRA	FRA
Shortstop	ND	ND	ND
Antioxidant	NST	ST	ST
Catalyst	OHP	OHP	OHP
Emulsifier	FA	FA	mixed
Nominal bound styrene, %	23.5	23.5	23.5
Conversion, %	60	60	60
Mooney viscosity, ML 1 + 4 (212° F.) — polymer	32	—	—
Compound	—	62	48
Coagulation	SA	SA	AC
Carbon black type	—	HAF	HAF
%	—	35.3	33.3
Oil type	—	HI-AR	HI-AR
Parts	—	10	50
Finishing	normal	normal	normal

NOTE: Abbreviations and symbols are defined as follows:
FRA = free radical type, i.e., iron-pyrophosphate, peroxamine sulfoxylate.
ND = non-discoloring.
ST = staining.
NST = non-staining.
OHP = organic hydroperoxide.
FA = fatty acid.
SA = salt acid.
AC = acid.
HI-AR = highly aromatic oil.

Committee D-11 on Rubber & Rubber-Like Materials of the American Society for Testing Materials through Subcommittee 13 on Synthetic Elastomers of D-11 has assigned numbers to three new styrene-butadiene rubbers, SBR 1510, as requested by Goodyear, and SBR 1607 and 1808, as requested by Shell Chemical.

It should be noted that SBR 1607 was originally listed and published as SBR 1804. However, because it contains less than 14 phr. of oil it belongs in the 1600 series.

SPI Standard-Flexible Polyethylene Pipe

A proposed commercial standard on flexible polyethylene pipe, incorporating minimum wall thickness requirements, was unanimously approved by the Thermoplastic Pipe Division of the Society of the Plastics Industry, Inc., at its quarter-year conference held recently at the Fairmont Hotel, San Francisco, Calif. The Division includes 52 pipe and fittings manufacturers.

This document covers three types of polyethylene pipe — depending on the derivative of the base resin in the pipe compound. These include Type I (0.910 to 0.925 specific gravity); Type II (0.926 to 0.940 specific gravity); and Type III (0.941 to 0.965 specific gravity), for low-density, medium-density, and high-density material, respectively.

The proposed standard covers one schedule and two series of polyethylene pipe including dimensions for Schedule 40, Series 2 and Series 3 polyethylene pipe.

The proposed standard also contains a number of performance requirements including a sustained pressure test and an environmental crocking test. It has now been forwarded to the commodity standards division of the United States Department of Commerce, where it soon will be established as a revision to the existing polyethylene pipe Standard CS 197-59.

The SPI Thermoplastic Pipe Division is now undertaking the preparation of a comprehensive engineering manual on all types of plastic pipe including installation techniques and recommended suitable applications. A sub-committee including pipe extruders and raw material manufacturers is developing a proposed test procedure to determine the allowable working stress on all types of plastic pipe, it was reported.

Charles Jones Retires

Charles E. Jones, who was working at the plant which Seiberling Rubber Co. bought in 1921 and who has been there continuously ever since, retired February 29 as vice president and comptroller.

Jones was one of two employes "inherited" from Portage Rubber Co., Akron, O., when Seiberling purchased it, and he began work for the new company as a factory accountant.

Subsequently he became manager of factory accounting, chief accountant, and comptroller and was elected a vice president in 1944. He became a director in 1951 and will relinquish that role at Seiberling's annual meeting in April.

Beside his work at the headquarters office, Jones has for years been a liaison man with Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., of which he is a vice president and a director.

Jones has been active in community affairs and as a leader in affairs of the rubber industry in addition to his business duties. During World War II he served as chairman of the general accounting committee of The Rubber Manufacturers Association, Inc., and he has been active as a member of other industry committees.

Sinclair-Koppers To Produce Styrene

At the first meeting of the newly formed Sinclair-Koppers Chemical Co., Pittsburgh, Pa., officers were elected, and plans were announced for the construction of a styrene plant. David L. Eynon, Jr., was elected chairman of the board, and John A. Scott was named president of the new corporation, which is jointly owned by Sinclair Oil Corp. and Koppers Co., Inc.

The Sinclair-Koppers board authorized immediate action on the preparation of engineering plans for a large, modern petrochemical plant to be erected at Houston, Tex. The new plant will produce styrene monomer, a basic chemical used in the manufacture of plastics, synthetic rubber, latex, and other products. Completion and operation of the plant is expected by mid-1961.

Sinclair Refining Co., a subsidiary of Sinclair Oil Corp., will supply the raw material for the new company. Koppers will use or market the styrene output of the plant, estimated to be 70 million pounds a year. Sinclair-Koppers will explore other opportunities for the manufacture of petrochemicals for which substantial markets exist.

Non-Toxic Mark Vinyl Stabilizers

Three new non-toxic vinyl stabilizers, Mark 33, Mark 34, and Mark 35, have been announced by Argus Chemical Corp., Brooklyn, N. Y. All three, deemed satisfactory in the advisory opinion of the Food & Drug Administration, provide excellent stability when used in plasticized formulations and are particularly effective in the stabilization of rigid compounds, according to Argus.

Any one of the three products can be used as the sole stabilizer system for rigid compounds. Because these stabilizers are non-liquid, they avoid the reduction in the heat distortion temperature level and the loss of other important physical properties which accom-

pany the use of liquid-type plasticizers and stabilizers. Also, with use of Mark 33, -34, and -35, increased stability can be obtained by raising the stabilizer level, reports Argus.

Mark 33 provides long-term stability in rigid stocks, equaling or bettering that of alkyl tin mercaptides. Mark 34 is recommended for compounds where good initial color is of primary importance and will supply the highest degree of clarity of the three stabilizers. Mark 35 represents a compromise between Mark 33 and Mark 34 in that it provides better initial color than Mark 33 and longer stability than Mark 34.

NEWS BRIEFS

CONTINENTAL CARBON CO., Amarillo, Tex., will construct at Bakersfield, Calif., what is said to be the first carbon black plant on the West Coast. The new facility, an oil furnace plant, with an annual capacity of 30 million pounds of carbon black, will cost in excess of $2.5 million. The major reason of the step is to enable Continental Carbon, through Witco Chemical Co., Inc., sole world-wide distributor of Continental's products, to broaden its service to the growing West Coast carbon black market.

DOW CORNING CORP., Midland, Mich., has announced the formation of two overseas subsidiaries. Dow Corning A.G., of Basel, Switzerland, and Dow Corning International S. A., of Panama. Dow Corning A.G., with a paid-in capital of two million Swiss francs, will finance and manage certain overseas interests of Dow Corning Corp., but will not engage in manufacturing operations in Switzerland. Dow Corning International S.A. will handle the overseas sales and service of the silicone products of Dow Corning Corp. and will have its first office at Zurich, Switzerland.

MONSANTO CHEMICAL CO.'S plastics division, Springfield, Mass., plans to reduce the base price of rubber-grade styrene monomer from 12.0 to 11.2¢ a pound, effective July 1, 1961. The reduction will reflect manufacturing economies expected from the recently announced 200-million-pound addition to Monsanto's styrene monomer capacity, the first stage of which is scheduled to be in operation in the first quarter of 1961. Styrene is a clear liquid raw material for the production of SBR, polystyrene plastics, protective coatings, polyester resins, and ion exchange resins.

THE FIRESTONE TIRE & RUBBER CO., Akron, O., reports that employes at its four synthetic rubber and plastics plants have compiled more than five million injury-free man-hours. The plants in Akron, Pottstown, Pa., and Orange, Tex., completed 1959 without a lost-time injury for a frequency of 0.0. The Lake Charles, La., plant had only one injury during 1959 for a frequency of 0.7. The over-all frequency rate for this division was 0.3 for 1959.

ARLEE FOAM RUBBER PRODUCTS, INC., Gardena, Calif., announces the addition of a 15,000-square-feet area to be devoted to increased production of flexible polyurethane foam, and the addition of rigid polyurethane foam facilities. The flexible foams are used for seating, pads, packaging, and padding. The rigid products will satisfy demands for insulation, flotation, packaging, and such diverse applications as missile nose cones. The rigid polyurethane weighs as little as one pound per cubic foot with a .12 "K" factor, has closed cells, will not absorb moisture and may be molded or sprayed, according to the Arlee company.

PRINCETON CHEMICAL RESEARCH, INC., Princeton, N. J., is a new contract research and development firm founded by Calvin N. Wolf. The fields of specialization of the new firm will include petrochemicals, polyolefins, and catalysis. Dr. Wolf and his associates also hope to pursue new ideas which they have developed in the fields of metal powder and fuel cells. Dr. Wolf previously was manager of research for Petro-Tex Chemical Corp., and prior to that time he had been engaged in chemical research and product development for Ethyl Corp. Telephone number is WAlnut 1-6945.

NAUGATUCK CHEMICAL DIVISION of United States Rubber Co., Naugatuck, Conn., has raised the price of Paracril CV because of increased manufacturing costs. The new price range is: truckload, 63¢ per pound; less than truckload, 64¢ per pound. Prices west of the Rocky Mountains are 1¢ higher. Paracril CV is shipped f.o.b. Baton Rouge, La., or warehouse, minimum freight allowed or prepaid.

POLYMER CORP., LTD., Sarnia, Ont., Canada, anticipates expenditures of $6.1 million in its 1960 capital budget. Of the total budget, $4.7 million are provided for capital items related to improvement of production units, and the continuance of work on the program of solution polymers and specialty types of rubbers. Provision is also made for expanding employe facilities and work in connection with the prevention of air and water pollution. A sum of $1.4 million is carried forward for completion of projects started in previous years.

ARMOUR INDUSTRIAL CHEMICAL CO. is breaking ground this spring for a new research laboratory and a pilot plant in McCook, Ill. The two one-story structures will cover more than 30,000 square feet on the west end of the Armour chemical plant property. Occupancy is scheduled for late fall. The new installations, self-contained and distinct from the adjoining plant, will be used for applied research in the fields of fatty acids and fatty acid derivatives and will be under the supervision of M. R. McCorkle, Armour Industrial Chemical Co. technical director.

INTERNATIONAL MINERALS & CHEMICALS CORP., Skokie, Ill., is in pilot-plant production of an active magnesium oxide with applications primarily in neoprene compounding and in uses requiring small particle size, high reactivity, and purity. The new grade is of the same purity as the company's present high-purity dead burned grade. Typical specifications include iodine number in the range of 100-115, particle size 100% below 2 microns, bulk density between 6 and 15 pounds per cubic foot. Samples are available from the company.

THE ALPHA-MOLYKOTE CORP., Stamford, Conn., is offering together with a descriptive bulletin free samples of Molykote G (a molybdenum disulfide grease-consistency lubricant) to the metalworking industry and others concerned with industrial lubrication. Molykote G is used throughout industry to eliminate fretting, galling, seizing, and metal pickup in high bearing pressure applications such as heavily loaded gears, cold metal forming, threaded connections, and press fitting.



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West Coast: Harwick Standard Chemical Company, Los Angeles, California

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Distributors of Phillips Chemical Company Products, 80 Broadway, New York 5, N. Y.

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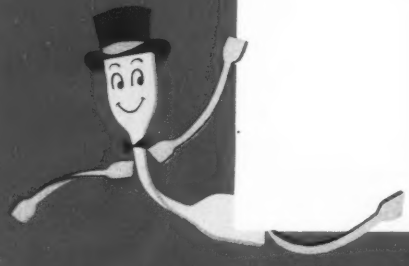
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to develop and produce oil furnace black . . . most widely used in the rubber industry today.

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with a Super Abrasion Furnace Black which added thousands of miles to the life of tire treads.

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New SAF masterbatch. Handling and mixing economy. Excellent wear and physical properties.

FOOD MACHINERY & CHEMICAL CORP., New York, N. Y., has dropped the name Westvaco from its divisional and brand identifications. The former Westvaco divisions will now be known as the Chlor-Alkali and Minerals Products divisions. The Chlor-Alkali division is a major producer of caustic soda, chlorine, soda ash, and solvents. The Minerals Products division is a fully integrated manufacturer of phosphates, barium products, and magnesias. These chemicals and all other products of the two divisions will in the future be known as FMC chemicals.

E. I. DU PONT DE NEMOURS & CO., INC., Wilmington, Del., reports that its neoprene is being used in neoprene-modified asphalt which is being specified for construction and maintenance of inside shoulders on the New Jersey Turnpike. Two installations totaling 13 miles in each direction have been completed between Newark and the northern terminus of the Turnpike near the George Washington Bridge. The modified asphalt, supplied by the asphalt division of Century Chemical Corp., is said to add safety and wear life in the shoulder surface. The material is applied with a standard tank wagon distributor, covered with ⅜-inch aggregate, rolled, and is ready for immediate use.

THE PAWLING RUBBER CORP.'S floor covering division, Pawling, N. Y., will expand its present line in 1960. The firm is now manufacturing a new line of Parco corrugated perforated mats. The new mats, available in black, brown, red, green, and grey, will have 3/16-inch circular perforations, one-inch on centers. The mat features beveled or square edges with corrugated or pyramid raised surfaces.

MOXNESS PRODUCTS, INC., has **started an 8,000-square-foot addition** to its plant in Racine, Wis. The present building, with 33,000 square feet, was completed two years ago. Moxness is a specialist in the molding of silicone and fluorocarbon elastomers and plastics and the extrusion of silicone rubber insulation tapes and tubing.

UNION CARBIDE CO.'S silicones division, New York, N. Y., has announced a price reduction of Union Carbide L-520 and XL-521 organosilicone copolymers. The price decrease is from $2.56 a pound in 55-gallon drums to $2.48 a pound. In truck-load quantities (45 drums) the new price is $2.46 a pound. L-520 and XL-521 are widely used in the making of polyurethane foam, particularly in the "one-shot" process. Technically, these chemicals are designated siloxane-oxyalkylene block copolymers.

SHELL CHEMICAL CO.'S synthetic rubber division, reports its new eastern district address is 110 W. 51st St., New York 20, N. Y. The new phone number is JUdson 6-5060.

COLUMBIAN CARBON CO., New York, N. Y., will construct in the Toronto, Ont., area a plant for the manufacture of carbon black to meet the growing requirements of Canadian consumers. The facility is expected to begin operations in 1961 with an initial annual capacity of approximately 40 million pounds of oil furnace blacks. The factory will be operated by Columbian Carbon (Canada), Ltd., which presently manufactures printing ink and dispersions of carbon black in various media.

AVISUN CORP., Philadelphia, Pa., has awarded an engineering contract for a 100-million-pound-per-year polypropylene plant to Bechtel Corp., San Francisco, Calif. The site of the plant, not yet selected, will be in the eastern part of the United States. AviSun is now operating a 20-million-pound-per-year polypropylene plant at Port Reading, N. J.; a 10-million-pound-per-year polypropylene film plant at New Castle, Del.; and a fiber pilot plant also at New Castle. The Port Reading facilities, leased from Koppers Co., are being expanded to a 25-million-pound-per-year capacity.

AMERICAN ENKA CORP., a major producer of Tyrex tire yarn and high-tenacity rayon for industry, has moved its marketing division headquarters to Enka, N. C. This division will be located in the newly constructed corporate office building, which adjoins the firm's plant and research center and which will house Enka's centralized top management. The marketing division was moved to the South to form a closely knit management team composed of marketing, research, manufacturing, finance, and administration.

FIRESTONE PLASTICS CO., Pottstown, Pa., is supplying Velon vinyl sheeting for use in new Foamatic lounge pads made by Holiday Line, Inc., Brooklyn, N. Y. The new pads feature automatically adjusted comfort, tailored to individual needs, which is obtained through a combination of plastic foam and air in a patented arrangement. The Foamatic pad is equipped with a small valve which permits individual adjustment of buoyancy by admission or emission of air. Velon is completely waterproof as well as resistant to the effects of sun, mold, and mildew. The lounge chair pad is available in three types — all Velon, Velon on one side and Velon-laminated cotton cloth on the other, and Velon-laminated cotton cloth on both sides.

UNITED STATES RUBBER CO., New York, N. Y., has introduced a "do-it-yourself" self-curing repair kit to enable industrial users to make permanent repairs to conveyor belting and other rubber products, without special equipment, highly skilled personnel, or the heat sources usually required for such operations. The kit, named the U. S. Holdtite Belt Repair Kit, consists of various styles and sizes of repair components (rubber and fabric-reinforced patches, sheet material, putties, and cements), the simple tools required to do most repair jobs, and an instruction manual. Separate components and tools are available to replenish original kits.

CADILLAC ASSOCIATES, INC., Chicago, Ill., in its latest survey of employment conditions during the last quarter reported a 20% gain in the demand for rubber and plastics engineers and executives. Demand for research and development men for developing processes for new products was up 30% over that of the previous quarter. Plant layout men experienced in equipment design, installation, and maintenance were up about 25%. There was a 15% rise in the demand for applied engineering men. The survey showed a drop of 12 to 15% in the demand for medium-income salesmen ($10,000 to $12,000 per year), indicating that rubber and plastics firms were interested primarily in promotable juniors or in upper-bracket men.

B. F. GOODRICH INDUSTRIAL PRODUCTS CO., Akron, O., is supplying its Koroseal vinyl magnetic strip to Weather-Seal, Inc., Barberton, O., who is using the magnetic strip on its aluminum storm-screen doors. The magnet shuts out cold air in the same manner as it seals refrigerator doors, and its magnetic pull draws the door tightly shut, eliminating the chance of the door remaining ajar. Two strips are used on the door: one is fitted into the latch side of the door; a matching strip fits on the jamb liner which is fastened to the outside door casing of the home. The new Weather-Seal doors are available in 18 different styles in 32 states.

THE GENERAL TIRE & RUBBER CO., Akron, O., has announced price increases on replacement tires and tubes, ranging from 3-5%, effective February 16. There is an increase of 3% on most passenger tires, most truck tires of 7.50 cross-section and smaller, all industrial pneumatic tires and tubes, and all farm tractor and implement tires. Prices of most truck tires and tubes of 8.25 cross-section and larger were raised 5%. Prices of passenger-tire tubes, truck-tire tubes of 7.50 cross-section and smaller, farm tractor and implement tubes, and industrial solid tires remain unchanged.

COLUMBIA-SOUTHERN CHEMICAL CORP. has begun construction of an ethylene dichloride plant at its Lake Charles, La., facility, adjoining its large chlorine and caustic soda manufacturing operation. The new plant will cost in excess of $1 million, and initial production is scheduled for September, 1960. Ethylene dichloride is a basic material used in the production of vinyl chloride, which, in turn, is used in making poly(vinyl chloride) plastic. Production of ethylene dichloride will mark Columbia-Southern's entry into chemicals based on ethylene. The firm has a contract with Petroleum Chemicals, Inc., for the supply of ethylene.

HEYDEN NEWPORT CHEMICAL CORP. has awarded a contract to Foster Wheeler Corp. to build a 24,000-ton a year tall oil refining plant at Oakdale, La. The new plant, expected to go on stream early in 1961, will be the corporation's second tall oil plant, converting crude tall oil to higher-grade products marketed by the corporation's Newport Industries Co. division, a leading producer of naval stores. The new plant will augment the production of already existing facilities in Bay Minette, Ala., which have a capacity of 36,000 tons a year. The new plant will produce tall oil rosins, tall oil fatty acids, and distilled tall oils.

THE B. F. GOODRICH CO., Akron, O., reports that capital expenditures for new and improved facilities and equipment in 1960 will approximate $50 million, largest in the firm's history, according to J. W. Keener, president and chief executive officer. The firm's outlook on capital investment calls for an average of $50 million a year for the next five years. While financing needs will depend to some extent on the timing of capital expenditures in relation to BFG cash flow, the firm shall not be reluctant, when and if it becomes timely and advisable, to go to the market for long-term funds. The projects approved for expenditure are now under way or in advanced engineering stages.

THE SOCIETY OF THE PLASTICS INDUSTRY, INC., New York, N. Y., reports that the effective date of the Food Additives Amendment has been extended for polyethylene as a packaging material for all Foods, by the Food & Drug Administration of the United States Department of Health, Education & Welfare. This law, which became effective March 5, is designed to prevent the use of packaging materials which allow harmful chemicals to migrate into the food. Under the law packaging materials must be accepted as safe by the Food & Drug Administration before they are used for the packaging of food.

MARBON CHEMICAL DIVISION, of Borg-Warner Corp., Washington, W. Va., has announced price reductions of Cycolac, acrylonitrile-butadiene-styrene plastic. The overall price reductions range from 7-9¢ a pound in truckload quantities. They include these changes: Natural Cycolac (pellets), from 58 to 49¢ a pound; standard and custom-colored Cycolac (pellets), from 58 to 51¢ a pound; natural Cycolac (powder), from 53 to 45¢ a pound. Price reductions are also reflected in less than truckload quantities.

THE BUNKER HILL CO., San Francisco, Calif., recently entered the zinc oxide market on the West Coast, making it the only primary producer of this product in the Pacific area, according to Roger H. Cutting, vice president. Zinc oxide represents an additional step in the company's program to broaden its product base, and a natural diversification move because of the firm's long-established basic position in zinc.

BOSTON WOVEN HOSE & RUBBER division of American Biltrite Rubber Co., Inc., Boston, Mass., plans to construct a new plant in Hohenwald, Tenn., according to James N. Mason, president of the division. This plant will occupy approximately 200,000 square feet and will cost about $3 million. The company is a leading manufacturer of industrial rubber products and requires the additional production facilities to meet the increasing demand for its products.

AMERICAN ENKA CORP., Enka, N. C., plans to expand its annual capacity for producing nylon 6 heavy denier yarns by an additional 3,000,000 pounds. The increased output is expected to be available in 1961. This increase, together with 3,500,000 pounds scheduled for production in the Fall of 1960, will give Enka an annual production capacity of 6,500,000 pounds of heavy denier yarns. The new capacity will be utilized for the production of nylon yarns for tires, home furnishings, cordage, carpeting, and auto upholstery.

THE CANADIAN GOVERNMENT has refused to sell Polymer Corp., Ltd., Sarnia, Ont., Canada. An offer to buy was made last June by J. D. Barrington, former Polymer president, on behalf of unnamed interests. The amount was $75,000,000. Defense Production Minister O'Hurley was quoted as saying that the government is not going to sell the synthetic rubber producing facility, and that he did not discuss the matter with his Cabinet colleagues. He further revealed that Mr. Barrington resigned as a director of Polymer Corp. on June 22, 1959.

THE B. F. GOODRICH FOOTWEAR & FLOORING CO., Watertown, Mass., recently joined a select group of Massachusetts companies which have achieved excellence in safety programs. Charles L. O'Reilly, president of the Massachusetts Safety Council, and Robert A. Chadborne, executive secretary of the Associated Industries of Massachusetts, jointly presented the "Meritorious Achievement Citation" to Raymond H. Blanchard, president. To qualify for the award a company must attain a total of at least one million consecutive manhours without a lost-time accident. The Watertown concern accumulated a total of 1,111,499 accident-free hours.

UNITED STATES RUBBER CO.'S research scientist, Clifford L. Hilton, Wayne, N. J., recently presented a paper on the identification by color of rubber chemicals before the analytical division of the New York Section of the American Chemical Society. Speaking on "The Determination of Flexzone 3-C and Other p-Phenylenediamine Derivatives," he explained that certain antiozonants like Flexzone 3-C can be converted to colored compounds by using a special oxidizing agent. The intensity of the colors of these compounds indicates their concentration, and the color itself identifies the particular antiozonant. The procedure works for many of the commercial p-phenylenediamine type of antiozonants.

SEIBERLING RUBBER CO., Akron, O., has been awarded a citation by the United States Department of Commerce for outstanding service to the United States Government during its participation in official overseas exhibits sponsored by the Commerce Department. Officials of Seiberling's shoe products division helped the U. S. Office of International Trade Fairs arrange American displays at trade exhibitions held last year in Poznan, Poland, and Salonika, Greece. The American exhibits featured model shoe-repair shops. Visitors to the exhibits were invited to have their shoes repaired free.

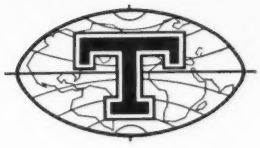
THE GOODYEAR TIRE & RUBBER CO., Akron, O., has developed a grooved conveyor belt used in a two-way Speedwalk pedestrian conveyor in Scott's Grand Central Market, Aberdeen, Wash. Made by Stephens-Adamson Mfg. Co., Aurora, Ill., the conveyor is equipped with maximum safety devices. Passengers ride a distance of 44 feet, in either direction, on a 15-degree incline between the market's main floor and second floor mezzanine. The belt's 24-inch width provides ample room for customers traveling between the two floors. Every 44 seconds, the conveyor reverses direction.

UNITED CARBON CO., New York, N. Y., plans to erect a $2.5-million center near Houston, Tex., which will house most of its research personnel and most of its operating units. Construction of a three-building unit, as anticipated, would include a one-story, 40,000-square-foot office building and a 37,000-square-foot one-story laboratory with an adjacent polymer development facility. In addition to research and development groups, most segments of the company's distribution, traffic, engineering, manufacturing, purchasing, and finance divisions also will be housed at the new site, which is scheduled for a late 1961 completion.

B. F. GOODRICH TIRE CO., at its Midwest regional distribution center in Kansas City, Mo., is storing nearly 800 big off-the-road tires inside an air-inflated building constructed with Geon-coated nylon fabric. The 226,195-cubic-foot air-building is said to be the first large-size air-inflated structure to be used for warehousing in the tire industry. Shaped like a quonset hut, it is 180 feet long, 60 feet wide, and 30 feet high, big enough to accommodate up to 30,000 passenger-car tires. When inventories return to normal, the structure can be deflated and stored in a relatively small space. The structure is supported by air pressure generated by a 2 hp. electric blower.

LINEAR, INC., Philadelphia, Pa., manufacturer of mechanical packings and seals, has appointed the recently formed J. Royal Co., Inc., Barrington, R. I., its distributor for the Boston-Providence trading area as well as Maine and New Hampshire. Kiva Sales Co., Phoenix, Ariz., has been added to Linear's list of western distributors. Elastolines, Inc., Newington, Conn., a recently formed company, will distribute in the New Haven-Hartford, Conn., and Springfield, Mass., areas. Haskel Seals division, Haskel Engineering & Supply Co., Linear's California distributor, has been named special representative to establish new distributors in 11 Far West states.

OLIN MATHIESON CHEMICAL CORP.'S packaging division, New York, N. Y., has developed a multi-wall bag with a special silicone coating on the inside for packaging synthetic and natural rubber, asphalt, adhesives, and similar tacky materials. The coating, originated by Dow Corning Corp., cannot contaminate the packaged product and prevents adhesion of the bag to the material being packaged. In addition, this coating does not migrate through the stock and will not transfer even under prolonged heat and pressure. It is odorless and colorless and does not change the appearance or basic characteristic of the stock.



Taccone symbol

TACCONE CORP., North East, Pa., with its recent entry in the hydraulic press field brings a new symbol to the rubber and plastics world (see illustration). The new all-steel, all-welded Taccone press embraces a new concept in press design, highlighting box beam sections of welded construction. Special features for transfer molding-upward and downward action-open and stroke sizes are handled in new design. Capacities range from 25 to 5,000 tons, with presses complete with platens, steam or electrical connections, with or without hydraulic pumping and automatic cycling equipment.

THE DAYTON RUBBER CO., Dayton, O., reports that its shareholders at the company's annual meeting recently granted permission to change the corporate name to The Dayco Corp. A new record was established in the number of shareholders voting as well as the number of shares voted. A total 999,152 shares were voted, representing more than 87% of the total shares outstanding. Shareholders also approved a stock option plan; the plan is limited to five years and 50,000 shares. Three directors were reelected for three-year terms: C. M. Christie, president, H. H. Kahn, and B. G. McCloud, Jr.

CENTRAL BELTING, HOSE & RUBBER CO., Richmond, Va., has been appointed a general distributor for a wide line of industrial rubber products made by United States Rubber Co. Central Belting, a 15-year-old firm, will serve the needs of the fast-growing industrial complex centered around the Richmond area. The firm will offer complete lines of hose, conveyor belting, power transmission products, packing, and many other items manufactured by U. S. Rubber's mechanical goods division.

FIRESTONE TIRE & RUBBER CO. OF CANADA, LTD., has manufactured what is said to be the first tire made in western Canada at its new Calgary, Alta., Canada, plant. The tire, a 750-14 Firestone Deluxe Champion tubeless tire was presented to Calgary's Mayor Harry Hays by T. M. Mayberry, president of Firestone of Canada. Full production of the plant is slated for next August. When completed, the plant will manufacture a full line of passenger, truck, bus, farm, and implement tires for western Canada.

B. F. GOODRICH CHEMICAL CO., Cleveland, O., reports that its Hycar nitrile rubber is now being used for tiny O-ring seals in cigarette holders. The seals are produced by the Acadia Synthetic Products division of Western Felt Works, especially for Tar Gard Laboratories, Chicago, Ill. The seals are said to prevent the escape of tars and nicotine, forcing them into the holder's filter where they can be trapped. Hycar was selected because it resists the attacks of cigarette tars and nicotine; it is dimensionally stable, non-toxic, and does not release any plasticizer, and it emits no irritating vapors which are due to the heat of the cigarette.

THE DAYTON RUBBER CO., Dayton, O., has agreed to acquire the assets of Metal Hose & Tubing Co., Dover, N. J., subject to completion of investigation. Metal Hose is a leading manufacturer of steel and fiber reinforced rubber hose sold under the trade name of "National," principally for use on gasoline pumps for service stations, fueling of aircraft, and other petroleum and service applications. The acquisition will give the Dayton Industrial Products division a major source of supply for highly engineered high-pressure hose and fittings. Metal Hose will continue its management and distribution policies, but operating as an autonomous subsidiary of Dayton Rubber.

THE FIRESTONE TIRE & RUBBER CO., Akron, O., has chosen Bethune, France, as the site of its new multi-million-dollar tire plant and synthetic rubber manufacturing facilities, the plans for which were announced last October. Construction of the one-story tire plant will begin immediately. When completed late in 1960, the plant will produce a full line of tires and tubes for passenger cars, trucks, buses, farm equipment, motorcycles, and scooters. An 81-acre site in Bethune, located north of Paris near the coast, was selected because of its excellent transportation facilities and the availability of plentiful supplies of water, power, and efficient manpower.

GOODYEAR TIRE & RUBBER CO., Akron, O., has developed a new custom contour tread rubber designed especially for retreading tires which have been worn round or round-shouldered. The new tread rubber has gradual, but distinct, contour step-ups that start low in the middle and build to their highest thickness in the shoulder areas. Each level of thickness is tailored to put the right amount of rubber at the proper places across the tread surface, filling the matrix of the mold at all areas. The tread rubber can be applied with no change in existing retread equipment, reports Goodyear.

News Briefs

PHILLIPS CHEMICAL CO., Bartlesville, Okla., has expanded its plastics activities to include the marketing of medium- and low-density Marlex polyethylene resins. These resins will be made from ethylene produced by Phillips and converted to polyethylene for Phillips at the National Distillers Chemical Corp. plant at Houston, Tex. Initially 14 Marlex medium- and low-density resins will be available for those fields in which resins of this type are well established and to which their characteristics are especially well suited. These include resins for the film, wire and cable coating, paper coating, injection molding, and blow molding fields.

THE FIRESTONE TIRE & RUBBER CO., Akron, O., reports that production operations are now under way at its new plant in Alcochete, near Lisbon, Portugal. The new company, known as Firestone Portuguesa, was formed by Firestone with Portuguese bankers and industrialists. Annual production capacity is expected to reach 120,000 truck and passenger-car tires and tubes. Pierre J. DeLarosiere has been named managing director for the new firm. George W. Thorsby becomes plant manager, and Vincent A. Morris, production manager at Alcochete.

H. MUEHLSTEIN & CO., INC., announces its new home offices at 521 Fifth Ave., New York 17, N. Y., effective May 1. The new, larger facilities will enable Muehlstein to render even more efficient service.

UNITED STATES RUBBER CO., New York, N. Y., will market the Delco line of dry-charged batteries, effective immediately, according to Herbert D. Smith, general sales manager, U. S. tires division. The batteries, in addition to the U. S. Powerlife batteries, will be made available for sale through the nationwide network of independent U. S. Royal tire dealers and will be stocked in all U. S. Rubber branches.

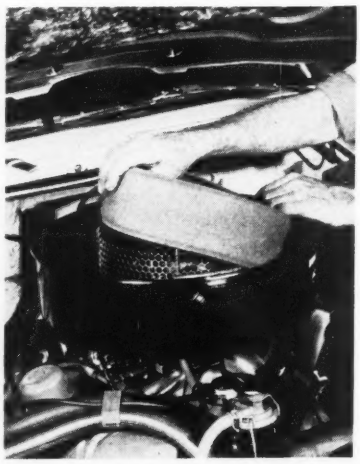
SEIBERLING RUBBER CO., Akron, O., will spend a record sum in 1960 to improve production facilities. The largest plant modernization program in the firm's history is valued at about $2 million. Most of this amount will be spent in the Barberton, O., plant in the truck-tire building department, the passenger-tire curing department, and the final finish department. New types of semi-automatic tire building machinery will be in regular production operation by the end of 1960. Other items in the improvement schedule include a new conveyor system for passenger tires, an asphalt test track for skid testing, improved dock facilities at the main plant and at a warehouse, and a large new calender for the plastics division.

CARY CHEMICALS, INC., will hold an open house at its Flemington, N. J., plant on April 27. Those in attendance will include Cary's customers and editors from the various technical publications.

GIVAUDAN-DELAWANNA, INC., and its associate companies, Givaudan Flavors, Inc., and Sindar Corp., have moved their Chicago office to new and modern quarters at 6778 Northwest Highway, Chicago 31, Ill. The telephone number is NEwcastle 1-9090.

L. A. DARLING CO.'S Workwall Division, Bronson, Mich., has switched from neoprene to natural rubber for all glazing strips in its complete line of movable partitions. Laboratory and field tests has proved to Workwall's satisfaction that natural rubber retains its resilience and flexibility longer than the other materials tested. It also retains its original color for a much longer period of time, according to Workwall. The switch will not affect the cost of the partitions.

SCOTT PAPER CO., foam division, Chester, Pa., is providing special urethane foam for use as an air filter in carburetor air cleaners. The easy-to-clean filter is being used in cleaners produced for several 1960-model autos by AC Spark Plug division of General Motors Corp., Flint, Mich. AC slices and contours the foam to the correct dimensions. Self-sealing lips at the top and the bottom of the cuff-shaped foam filter eliminate the need of gaskets. The element slips easily into place around the perforated metal frame inside the cleaner housing. Before installation, the foam filter is impregnated with oil to obtain a high filter efficiency. The urethane foam is resistant to oils, solvents, soaps, and detergents and can be washed and dried.



Installing open-pore urethane foam cuff in carburetor air cleaner

TEXAS-U. S. CHEMICAL CO. has announced an expansion program to increase the output of its Port Neches, Tex., synthetic rubber copolymer plant by approximately 156,000 long tons annualy. The expansion will be mainly centered in additional drying and carbon black masterbatch production facilities. The need of the expansion was created by increased demand for homogenized masterbatches of carbon black and Synpol SBR's commercially introduced about two years ago. Construction is expected to be completed late in 1960. Full production from the new facilities is scheduled for early 1961.

ERIEZ MFG. CO., Erie, Pa., is offering a booklet which describes its new line of Erium-powered permanent magnetic pulleys for automatic separation of large or small iron contamination. Two new models are offered. Model CR pulleys are constructed with a radial design to maintain a powerful magnetic field suitable to heavy applications involving large pieces of tramp iron. This model is available in 12-inch through 36-inch diameters. Where small or medium tramp iron, as well as fine iron contamination in average material flows, is involved, the Model AA pulley is recommended.

SWAN RUBBER CO., Bucyrus, O., is making a new bright-green garden hose, called "Heirloom," which has a rugged outer covering of Du Pont's "Hypalon" synthetic rubber. Tests by Swan indicate that the hose, which comes in 50-foot lengths, may be expected to resist fading and discoloration for the duration of its wear life, estimated at 20 years or more. The hose is said to have outstanding resistance to temperature extremes, ozone, chemicals, oils and greases, and abrasion.

HOOKER CHEMICAL CORP., Niagara Falls, N. Y., and ATANOR, Compania Nacional para la Industria Quimica, S.A.M., one of Argentina's largest industrial corporations, have announced plans for a new jointly owned phenol plant in Argentina. A new company, Duranor, Industria Quimicas Sociedad Anonima Industrial y Comercial, was formed in January, 1960, for this purpose. Its establishment as a manufacturer is contingent upon successful negotiation of a substantial loan to Duranor by the Export-Import Bank of Washington, D. C., for purchase of equipment in the United States. Plans call for building the facility at one of Atanor's two established plant locations, with construction slated to begin about July, 1960. Duranor will have capacity to produce 25 metric tons per day of phenol by the newly developed phenol process.

You get safe, easy processing, with excellent physical properties and good aging when you use

AZO ZZZ-55-TT

A Treated ZINC OXIDE for Rubber



OTHER ADVANTAGES OF AZO ZZZ-55-TT

Rapid incorporation
Increased dispersion
Faster curing
Safe processing
Improved scorch resistance
Lower acidity
High apparent density
Low moisture absorption
High tensile strength
Increased tear resistance

NOTE:
AZO rubber grade zinc oxides are also available as AZODOX (de-aerated). AZODOX has twice the apparent density, half the dry bulk.

AZO ZZZ-55-TT is a superior zinc oxide for general use in rubber, heat treated in a controlled atmosphere, and also treated chemically to improve its physical properties and features. It can be used to advantage at activation levels in stocks mixed on the open mill, and at reinforcing levels in highly loaded Banbury stocks and masterbatches.

If you have been considering the use of a treated zinc oxide, may we suggest that you test AZO ZZZ-55-TT in your most exacting recipes. Samples on request.

American Zinc sales company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

NEWS about PEOPLE

J. Boyd Britton has been elected to the board of directors and has been appointed vice president in charge of development for Godfrey L. Cabot, Inc., Boston, Mass. Britton was formerly vice president in charge of operations.

Charles E. Stonebraker becomes manager of customer service for B. F. Goodrich Industrial Products Co., division of The B. F. Goodrich Co., Akron, O. Prior to this appointment he was staff credit manager.

Charles R. Weimer has been appointed sales manager of mats and matting, tapes, and cutting boards, all products of the mechanical goods division, United States Rubber Co., and will direct the nationwide sales activities of his product lines from Passaic, N. J. He was formerly assistant advertising manager of the mechanical goods division.

Roger L. Steller becomes eastern field sales manager of Hycar special-purpose rubber for B. F. Goodrich Chemical Co., Cleveland, O., and will be responsible for sales in all East Coast states and Tennessee and Alabama. His previous position was Hycar sales representative for the New England area.

S. P. Terlecky has been promoted to manager of wire braid hose sales, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O. He was a field representative for the Pittsburgh district.

Charles H. Sommer has been elected president of Monsanto Chemical Co., St. Louis, Mo., and **Charles Allen Thomas** is now chairman of the board of directors. Thomas formerly was president, and Sommer, executive vice president. In addition, Sommer is now chairman of the executive committee and a member of the finance committee. Edgar M. Queeny, board chairman since 1943, was reelected chairman of the finance committee and will remain a board member and a member of the executive committee.

Alex T. Sturrock becomes senior development engineer, new products development, for Goodrich-Gulf Chemicals, Inc., and will be located at the new products development laboratories of the Institute, W. Va., plant where he will be in charge of new products applications for man-made rubbers. He comes to Goodrich-Gulf from the Moreland Corp.

Loren A. Murphy has been appointed vice president, Goodyear Aircraft Corp., Akron, O. In his new capacity, Murphy will have jurisdiction over all the manufacturing operations of the company and responsibility for personnel and master planning functions.

Gerald A. Balzersen is now plant manager of B. F. Goodrich Chemical Co.'s vinyl resin plant at Niagara Falls, N. Y. His former position was operations manager at the Avon Lake, O., development center.

Irving B. Terjesen is now production manager of Plant I, The Firestone Tire & Rubber Co., Akron, O. **James P. McDonnell** succeeds him as production manager of Plant II. McDonnell was formerly manager of material preparation at Plant II. In addition, **R. A. Black** and **Fred Harris, Jr.,** have been named department managers; **Russell L. Brown** becomes general foreman; **Ralph D. Eifert** is industrial relations representative; and **Donald E. Grubb** has been appointed general foreman. Plant I. **William T. Martin, Jr.,** has been assigned as department manager, and **Tom E. Judy,** industrial relations representative at Plant II.

Theodore V. Busk has retired as advertising manager of Farrel-Birmingham Co., Inc., Ansonia, Conn. He has been with the company since 1916 and has been advertising manager since 1928. **Arthur Strahan** will now direct the advertising for products manufactured in the Connecticut plants at Ansonia and Derby; while **Harry Genzken** will handle the lines manufactured in the New York State plants at Rochester and Buffalo.

E. J. Mytkowicz will fill the newly created position of vice president in charge of operations, Hewitt Rubber Division, Hewitt-Robins, Inc., Stamford, Conn. The Division produces conveyor belting, industrial hose, and molded rubber products at plants in Buffalo, N. Y., and Fremont, O. Mytkowski was previously manager of operations at the Jones Machinery Division, Chicago, Ill.

John M. Gerber has been named general manager of the instrument division, The Electric Autolite Co., Toledo, O. Prior to this appointment he was manager of the Hazleton, Pa., plant which produces wire and cable for aircraft, missile, and nuclear applications. **Edward A. McNally** will be in charge of the division's plants at Port Huron, Mich., and at Hazleton. He headed the Port Huron operations since 1956.

William S. Edgerly has been elected assistant treasurer of Godfrey L. Cabot, Inc., Boston, Mass. With the company since 1952, he was recently made head of the financial department.

John W. Becker has been elected a vice president of National-Standard Co. of Canada, Ltd., Guelph, Ont. He will continue as manager of the company.

Robert W. McCullough becomes western district manager for the rubber chemicals department, American Cyanamid Co., and will be headquartered at the company's general office in Los Angeles, Calif. He joined Cyanamid in 1950 and has served in various capacities with the rubber chemicals department since 1953.



I. B. Terjesen



J. P. McDonnell



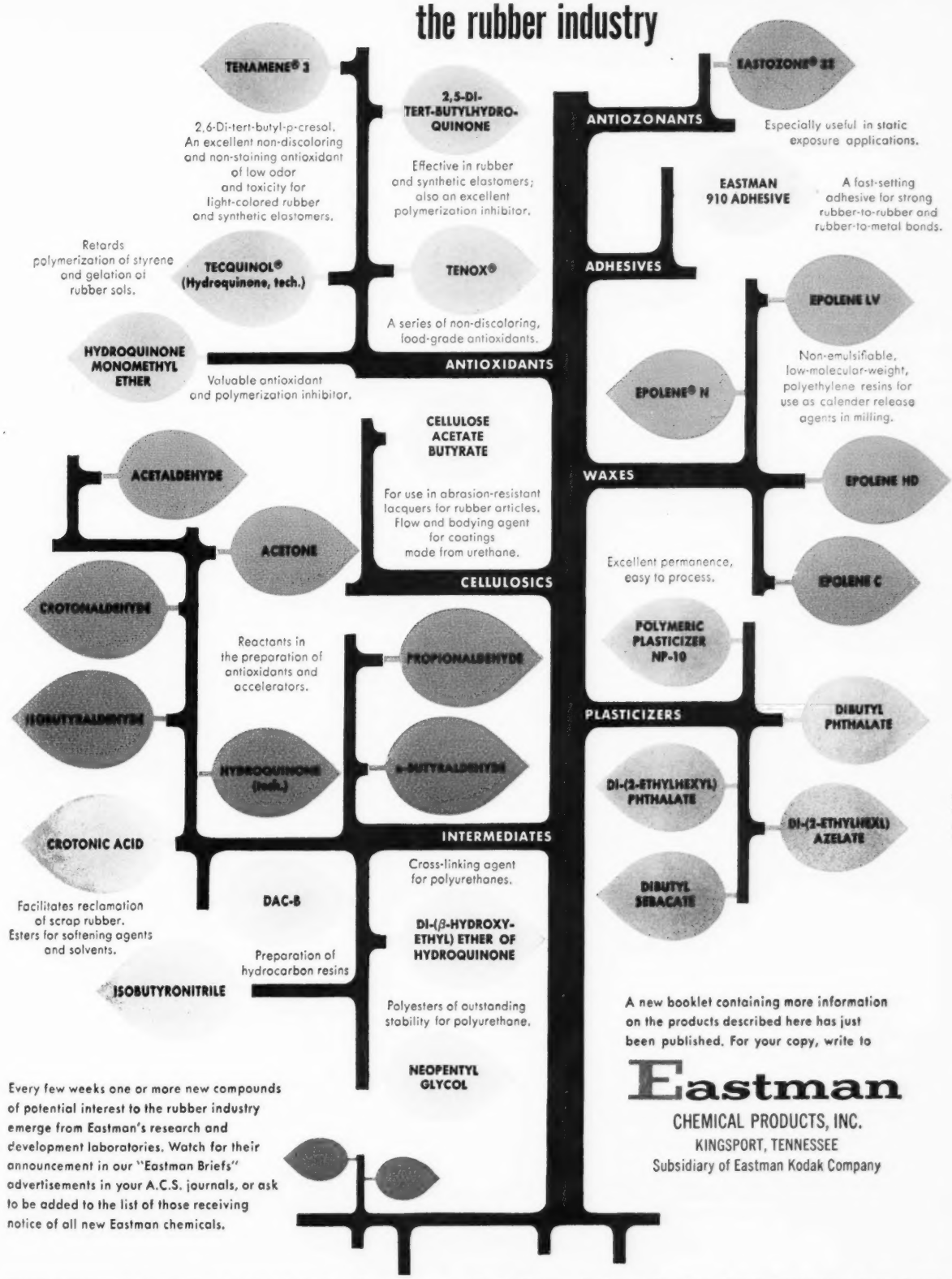
R. W. McCullough



J. W. Becker

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A family of fine products to serve the rubber industry



Every few weeks one or more new compounds of potential interest to the rubber industry emerge from Eastman's research and development laboratories. Watch for their announcement in our "Eastman Briefs" advertisements in your A.C.S. journals, or ask to be added to the list of those receiving notice of all new Eastman chemicals.

A new booklet containing more information on the products described here has just been published. For your copy, write to

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News about People


B. Putman


H. G. Wilson


P. A. Frampton


D. Wright


R. H. Marks


J. H. Rines

Bryan Putman has been appointed manager of public relations, Goodyear Tire & Rubber Co., Akron, O., to succeed **Herbert G. Wilson,** who becomes company historian. Putman will have overall responsibility for all public relations operations at Akron and in regional offices in other cities. Engaged in newspaper, press association, and public relations activities for the past 19 years, he joined Goodyear's public relations staff in 1959. Wilson, who will serve in a consulting capacity to the public relations program for the next two years, has been with the company since 1919.

William Carpenter has been appointed assistant to President **David G. Hill** of Pittsburgh Plate Glass Co., Pittsburgh, Pa. Carpenter was formerly St. Louis district sales manager for Columbia-Southern Chemical Corp., a wholly owned subsidiary of Pittsburgh Plate Glass.

William Yarnall, Jr., has been named general sales and service manager of The Firestone Tire & Rubber Co.'s racing division for the Pacific Coast. Under his direction, major racetire supply points will be established in Las Vegas, Fresno, San Francisco, Sacramento, Portland, Seattle, Denver, Phoenix, Salt Lake City, and San Diego. His headquarters will be in Los Angeles, Calif. Yarnall has been affiliated with the racing division since 1953.

Philip H. Lawrence has been appointed plant manager for the B. F. Goodrich Chemical Co.'s vinyl resin and compound plant now under construction near Long Beach, Calif. He was formerly plant manager at the Niagara Falls, N. Y., plant.

Paul B. Hanrahan has been named a technical sales representative in the Midwest region for Union Carbide Plastics Co., a division of Union Carbide Corp., and will be headquartered at the St. Louis, Mo., office. He will handle sales of Bakelite brand molding and extrusion materials which include polyethylene, phenolic, styrene, and vinyl resins and compounds.

David Wright is now vice president and sales manager for Falls Engineering & Machine Co., Cuyahoga Falls, O. **Ashton L. Worrall, Jr.,** becomes chief engineer. In addition, **Archie E. Bragg** has been named production manager, and **Carl L. Ford,** development engineer. **Paul A. Frampton** has been appointed sales and service engineer. **Robert Hague** has been made manager of service operations; while **Harold L. Hilbish** fills the position of purchasing agent and chief estimator.

Wendell Guy has been appointed to the newly created position of staff manager in charge of methods engineering and quality control, Moxness Products, Inc., Racine, Wis. Guy has been active in management at the company for nine years. Moxness Products is in the silicone rubber molding and extruding field.

A. F. Thomas will fill the newly created position of sales manager for The Goodyear Tire & Rubber Co., films and flooring division, Akron, O. He will assume sales responsibility for all division products, which include flooring, packaging films, and plastic films and sheeting.

Charles H. Hahn has been named vice president and general manager of the tire division, The Dayton Rubber Co., Dayton, O. He will be responsible for coordinating tire sales, merchandising and distribution programs on a national scale; he will also have charge of tire manufacturing and development.

Adalbert Farkas has been named assistant director of research at Houdry Process Corp., Philadelphia, Pa. An internationally known scientist in catalysis and petrochemicals, Dr. Farkas previously headed the organic research section which developed Houdry's new catalyst, DABCO®, used in the production of polyurethane foams.

D. S. Hamilton is now manager of industrial products sales for American Hard Rubber Co., Butler, N. J. He joined the company in 1948.

Raymond H. Marks is now executive vice president, Cary Chemicals, Inc., East Brunswick, N. J. Formerly vice president in charge of sales, Marks will now coordinate all manufacturing, research, and sales activities. Cary Chemicals manufactures poly(vinyl chloride) resins and compounds, rubber compounding ingredients, and synthetic waxes.

J. H. Rines has advanced to manager, rubber chemical sales, Pitt-Consol Chemical Co., Newark, N. J. He will be completely responsible for United States and foreign sales of the company's rubber chemicals.

John A. England, Jr., has been named secretary-treasurer of U B S Chemical Co., Cambridge, Mass. He succeeds **Charles V. Glynn,** recently elected comptroller of A. E. Staley Mfg. Co., Decatur, Ill., parent company of U B S.

Ralph Bloom, Jr., becomes Washington, D. C., representative for the chemical divisions of Food Machinery & Chemical Corp. He succeeds **Philip H. Groggins,** now senior scientific adviser concerned with special studies. Bloom's responsibilities will include all the company's chemicals, with emphasis on peroxygen compounds, Dimazine®, and other missile fuels.

J. F. Sayre has been appointed to the newly created position of manager, purchasing and transportation, Polymer Corp., Ltd., Sarnia, Ont., Canada. **H. H. Manktelow,** manager, traffic department, and **J. V. Lawlor,** recently appointed purchasing agent, will report to Sayre. Prior to this appointment Sayre was manager of the purchasing and stores department.

Thomas B. Sparks has been appointed product sales manager of industrial chemicals for Michigan Chemical Corp., St. Louis, Mich. He joined the company in 1957 as a salesman. **I. M. Anderson** is now technical service representative of magnesia sales. He was formerly supervisor of magnesia production at the St. Louis plant.

ENJAY DELIVERS 1,000,000th LONG TON OF BUTYL!

PRODUCTION FACILITIES INCREASED TO MEET CONSTANTLY GROWING DEMAND

There have been many elastomers developed since the first commercial ton of Butyl was used in 1943, but no other rubber, synthetic or natural, offers so many outstanding properties for so many applications.

Plant expansion plans announced recently will increase butyl production capacity some 50 percent by 1961 and, at today's rate of consumption, the two million-ton mark will be reached within the next six or seven years. Two new additions to the butyl product line, Chlorobutyl and Butyl Latex, will soon be available in commercial quantities.

VERSATILE ENJAY BUTYL'S OUTSTANDING PROPERTIES MAKE IT SUPERIOR TO OTHER RUBBERS FOR MANY APPLICATIONS. SOME ADVANTAGES:

- RESISTS TEAR AND ABRASION ... used in the new and revolutionary all-butyl tire.
- STANDS UP AT HIGH TEMPERATURE ... used in steam hose and tire curing bladders
- HAS EXCELLENT ELECTRICAL PROPERTIES ... used in high voltage cable insulation
- IS IMPERMEABLE TO GASES ... used in virtually all rubber air-holding applications
- HAS WIDE RANGE OF DYNAMIC PROPERTIES ... used in over 100 applications on the modern automobile
- DISPLAYS OUTSTANDING CHEMICAL RESISTANCE... used for the storage and shipment of many chemical and commodity products
- WITHSTANDS EXPOSURE TO SUN AND WEATHER ... used in irrigation pipe and roof coatings.

Want to find out fast, how versatile Butyl can improve your product? Call or write the nearest Enjay office.

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EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY COMPANY, INC.

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News about People

John D. Jarema has been appointed plant manager for The Firestone Tire & Rubber Co.'s Fibrocast products plant at Magnolia, Ark., to succeed **J. A. Moore,** who retired after 45 years with the company. Last year Jarema was named chief engineer for the molded fiber products, or Fibrocast, division.

Herbert R. Clark is now technical service specialist, technical service department, Union Carbide Plastics Co., division of Union Carbide Corp., New York, N. Y. The former technical representative will move from Philadelphia, Pa., to Bound Brook, N. J. **Richard G. Hess** will handle flexible packaging, bonding, and laminating sales for the upper New York State area, from his office at Rochester, N. Y. In addition, **Howard L. McCurdy,** formerly technical correspondent, becomes technical sales representative in the south Atlantic regional office at Moorestown, N. J. **Charles W. Naylor** is a sales trainee in the Midwest regional office at Chicago, Ill.; while **Douglas L. Peterson** joins the north central regional office, Cleveland, O., as technical representative trainee.

George J. Webster has been elected president and general manager of United Carbon France, S.A., the newly created French subsidiary of United Carbon Co., New York, N. Y. **John Bahm,** international sales manager for United Carbon Co., Inc., is now also vice president of the new subsidiary. **R. W. French, Henride Roubin, A. G. Treadgold,** and **H. B. Lawson** have been appointed directors. United Carbon France has begun initial plans to build a 50-million-pound carbon black plant in northern France, just outside of Rouen.

Richard Strauss has been appointed development manager for National Polychemicals, Inc., Wilmington, Mass. Previously he was research engineer at American Cyanamid Co. The Wilmington plant produces organic chemicals, plasticizers, and synthetic resins. The company also has a recently opened plant in Conway, N. C., to manufacture synthetic resins.

Werner A. Bacher is now staff assistant for the foreign operations department, Godfrey L. Cabot, Inc., Boston, Mass. **Warren C. Yee** has joined the fundamental research section of the carbon black technical department as junior chemist; while **Richard F. Heitmiller** has been appointed group leader, polymer research, for the new products research department. In addition, **Adam Orzechowski** is group leader of catalysis research, and **Charles I. Tewksbury,** group leader of organic research for the organic and polymer research section, new products research department. **Henry Wigton** becomes group leader for the applied research section of the same department.

H. E. Humphreys, Jr., United States Rubber Co.'s chairman of the board, has been named rubber industry chairman of the $3.5-million Golden Anniversary Boy Scout Capital Camp Campaign being conducted on behalf of the Greater New York Councils of the Boy Scout Movement. The campaign's start was signified by a breakfast at the Biltmore Hotel, New York, N. Y., March 18, at which Governor Nelson A. Rockefeller was the guest speaker. Goal of the effort is to improve existing facilities and develop new ones at six camps operated for the 84,000 Scouts of Metropolitan New York.

J. E. Gieck has been made Airide sales manager for Firestone Industrial Products Co., Noblesville, Ind. He was recently head of the sales engineering staff at Detroit, Mich.

Henry J. Sullivan becomes technical sales representative for Harwick Standard Chemical Co., Akron, O., and will work out of the Boston, Mass., office. He has had more than 10 years of experience as a chemist engaged in product development, production control, technical sales and service. **G. Robert Moore** also joins the company's sales organization and will be located in, and responsible for, the San Francisco Bay Area territory. He has had ten years of varied experience with The B. F. Goodrich Co. and B. F. Goodrich Chemical Co.

Harry J. Glutting, Jr., becomes plastic materials sales representative for B. F. Goodrich Chemical Co. and will make his headquarters at San Francisco, Calif. Glutting, formerly a plastic materials representative for the company in Boston, will now service the area from San Francisco to the Canadian border.

Murray Berdick and **William E. Holland** have been elected vice presidents of Evans Research & Development Corp., New York, N. Y. Dr. Berdick, formerly coordinator of research, will take over administrative responsibilities for the laboratory of 60 scientists. Dr. Holland will be responsible for client liaison and contract administration. He has been development manager since 1955.

James Marmor has been appointed contract coordinator of the military products department, marketing division, The Garlock Packing Co., Palmyra, N. Y. From his base in Palo Alto, Calif., Marmor will be responsible for military contract accounts west of Salt Lake City, Utah. He was formerly with the missiles and space division of Lockheed Aviation.

Donald R. Kronenberger is now comptroller of Seiberling Rubber Co., Akron, O. He succeeds **Charles E. Jones,** vice president and comptroller, who retired after 38 years. Kronenberger was previously assistant to the comptroller.

Leonard J. Sacks becomes western district sales manager for General Electric's silicone products department and will be located at the Downey, Calif., sales office. Previously a sales representative for the department's eastern district, Sacks succeeds **Dean Daniels,** who is now sales manager for the insulating materials department.

Harold W. Catt has been named corporate director of purchases and traffic for The B. F. Goodrich Co., Akron, O. He was previously general manager of B. F. Goodrich Aviation Products Co.'s rocket motor plant at Rialto, Calif.



G. J. Webster



J. E. Purdy Co., Inc.

R. Strauss



G. R. Moore



Harvard Studio

H. J. Sullivan



L. J. Sacks



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News about People



Madison Geddes

F. C. Hands



R. H. Taylor



G. T. Wingate



John F. Kirk



M. H. Manugian

B. van Arkel



M. H. Manugian

A. C. Rowley

Fred C. Hands has been made director of procurement for Goodrich-Gulf Chemicals, Inc., Cleveland, O. In his new capacity he will act as a member of the president's corporate staff to procure raw materials and supplies for all Goodrich-Gulf operations. Prior to this appointment he was plant manager of the company's synthetic rubber plant at Institute, W. Va.

Rolla H. Taylor has been named sales manager for Scott Testers, Inc., Providence, R. I., manufacturer of physical testing equipment. Taylor, who has been assistant sales manager since 1958, will have charge of sales of Scott equipment throughout the United States and more than 60 foreign countries.

Alan W. Bryant has been appointed sales manager, industrial products, for the carbon black and pigment division of Columbian Carbon Co., New York, N. Y., and will be responsible for sales of all division products to customers other than those in the rubber industry. **Donn A. Snyder** becomes products manager for Mapico iron oxides, and **John J. Peters,** product manager for specialty blacks and base dispersions. Both will report to Bryant. **John A. Stipak** will do the market studies for the division; while **Roger J. Daly** will be responsible for advertising and sales promotions.

Richard R. Long, factory manager, silicone department; **Albert V. Volpe,** factory manager, extrusion and lathe departments; and **John J. Kravetz,** technical research director, have been elected to the board of directors, The Stalwart Rubber Co., Cleveland, O. The company produces custom silicone rubber parts and mechanical rubber goods.

B. A. Vallerga has been appointed director of products engineering for Golden Bear Oil Co. From his headquarters at Bakersfield, Calif., Vallerga will supervise and direct the engineering and promotional activities relating to the applications and uses of the company's petroleum products for soil conservation and highway construction.

George T. Wingate has been appointed senior sales representative to the chemical division of The Goodyear Tire & Rubber Co., Akron, O. He will be assigned to the division's Philadelphia, Pa., district and will cover the Washington, D. C., and Baltimore, Md., areas for the division's line of synthetic rubbers, latices, plastics, and chemicals.

John F. Kirk, vice president since 1954 and a member of the board of directors since 1958, has been named executive vice president of Velsicol Chemical Corp., Chicago, Ill. **Bernard H. Lorant,** formerly assistant to the president in charge of research, is now vice president in charge of research and a director. **A. B. Chadwick** becomes vice president in charge of manufacturing and engineering after having served as director of manufacturing and engineering.

Robert M. Stroman has been promoted to manager, Buffalo sales district, and **Edward F. Borro, Jr.,** to assistant product manager, molding compounds, in the sales department of the Durez Plastics Division, Hooker Chemical Corp., North Tonawanda, N. Y. Stroman has been a molding compound sales representative since 1953 and will now move his headquarters from New York, N. Y., to Buffalo, N. Y. Borro will now be located at North Tonawanda. He was a sales representative in the Chicago, Ill., district.

George D. Godfrey has been elected president of W. J. Voit Rubber Corp., Los Angeles, Calif. He succeeds **Willard D. Voit,** who is now chairman of the board. Godfrey was formerly vice president, marketing. The firm, a subsidiary of American Machine & Foundry Co., produces sports equipment, retread rubber, and tire repair materials.

Gordon K. Billipp becomes manager of floor product sales for the industrial division of Armstrong Cork Co., Lancaster, Pa. The former manager of new product development succeeds **Howard C. Simpson,** who has retired after more than 40 years with the company.

Arthur C. Rowley has been appointed assistant director of the R. T. Vanderbilt Co., Inc., laboratory at East Norwalk, Conn. **Bernard van Arkel** has been assigned to the Midwest sales territory formerly covered by Rowley.

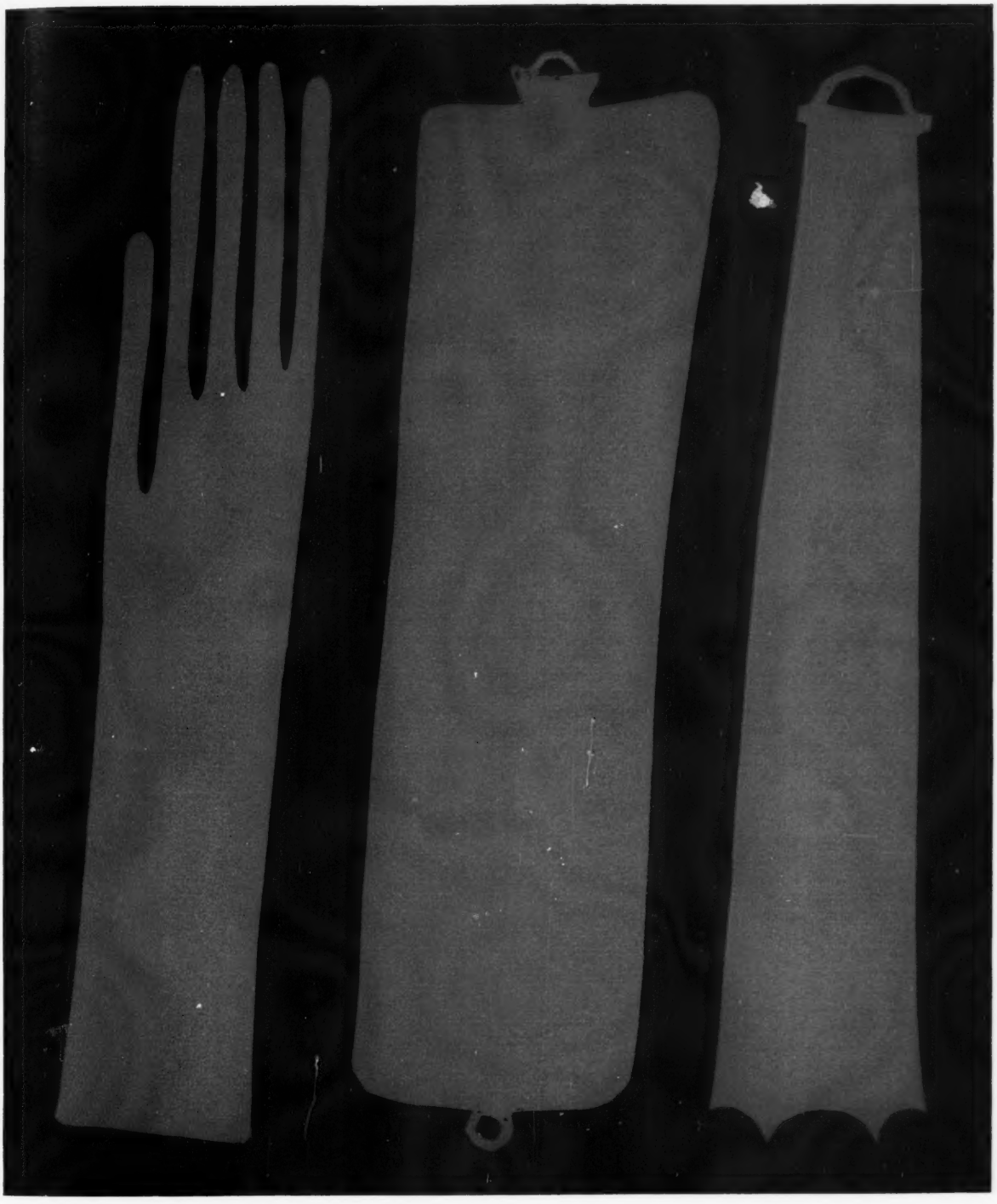
Walter P. Krause has been named supervisor, plant and sales technical service section of Jefferson Chemical Co.'s Austin, Tex., laboratories. He will have charge of customer service work requested by the marketing department as well as experimental work designed to assist that department in solving plant problems.

T. Raymond Thayer, M. Boylan Carr, and **Claude S. Ramsey, Jr.,** will head the three major operating areas of the marketing division, American Enka Corp., New York, N. Y. Thayer is now director of sales for tire and industrial yarns and rayon staple fiber. He was formerly marketing manager for tire and industrial yarns and rayon staple. Carr has been named director of sales for textile rayon and nylon yarns. Ramsey will direct market development, supervise merchandising and advertising programs, and handle marketing technical and customer service activities and the marketing research program.

James L. Killian is now project engineer in charge of the tire technical section of International B. F. Goodrich Co., a division of The B. F. Goodrich Co., Akron, O. He was manager of the company's European technical service with headquarters in The Hague, Holland, from 1957 until he returned to Akron in 1959.

Donald D. Davidson has been elected a vice president of Golden Bear Oil Co., Los Angeles, Calif.

Lawrence M. Thompson joins Manheim Mfg. & Belting Co., Manheim, Pa., as director of engineering and will be in charge of quality control of all company products including Veelow adjustable V-belt, and Manheim variable speed belt. His responsibilities also include product research and development and plant engineering.



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News about People

D. Stewart Quern will fill the newly created position of senior sales coordinator for industrial chemicals in the southeastern territory for the chemical divisions of Food Machinery & Chemical Corp., New York, N. Y. Previously southern sales manager of the Becco Chemical Division, he will now work with all the chemical divisions to coordinate their contacts with customers and to expand sales of the company's industrial chemicals.

R. D. Young has retired as president of Rubber Trade Association of New York, Inc., New York, N. Y. He will continue to serve as consultant to several New York firms: Avia Co. of New Jersey, Robert Badenhop Corp., J. S. Cornell Corp., Allan L. Grant Co., Inc., and Imperial Commodities Corp.

Frank R. Carvell is the new general manager, rocket motors, for the aviation products division of The B. F. Goodrich Co. at Rialto, Calif. He was production manager at B. F. Goodrich Chemical Co's development center at Avon Lake, O., until his recent transfer to the aviation products division.

Ralph Erickson, vice president of sales, Texas Butadiene & Chemical Corp., New York, N. Y., is serving as chairman of the broker group for the American Red Cross campaign in Greater New York.

Paul Jennings has been named administrative assistant for Dayton Rubber International, a division of The Dayton Rubber Co., Dayton, O. He was on a corporate staff position handling liaison with other operating divisions of the company before he was named to his new post. **Anthony Grogean** is now manager of overseas training and will be responsible for setting up and carrying out personnel training programs covering all phases of tire manufacture, and for foreign trainees at the Dayton plant.

Obituaries

Paul W. Gamble

Paul W. Gamble, factory manager of Xylos Rubber Co., a division of The Firestone Tire & Rubber Co., Akron, O., died of a heart attack at his home in Akron on March 3.

He joined Firestone as a foreman at Xylos in 1926 after having worked for several other rubber firms. In 1929 he became superintendent of the plant and in 1937, factory manager.

Mr. Gamble was born 61 years ago in Wheeling, W. Va., but came to Akron as a boy. In Akron he was graduated from Central High School and Hammel Business College. He was active in Masonic organizations and the YMCA.

He is survived by his wife and his daughter.

Funeral services were held on March 7 in Akron.

C. Pelizzola

Camillo Pelizzola, well-known Italian rubber chemist, died, after a brief illness, in Milan, Italy, September 11, 1959.

He was active in the chemical research laboratory of the Pirelli of Milan from 1918 to 1924, when he worked under the famed Prof. Giuseppe Bruni. Later he worked for various important rubber companies in Italy and elsewhere. His published works include such topics as manganese and tackiness of raw rubber, aging of vulcanizates, thermal analyses of the system sulfur p.dichlorobenzene, effect of antioxidants on vulcanizates, low-temperature vulcanization with organic accelerators, coagulation of *Hevea* latices, ebonite, and PVC for floorings.

The deceased was born January 24, 1892, in Corteleona, Pavia, Italy.

C. A. Giesler

Clarence A. Giesler, president, Jasper Rubber Products, Inc., Jasper, Ind., died February 14 in Memorial Hospital, Jasper.

Mr. Giesler was one of the founders of the company and served as president since its beginning in 1950.

He was born on December 8, 1900, in Jasper and lived there his entire life.

Funeral services were held February 17 at the Precious Blood Church in Jasper.

He is survived by his wife, his son, and three grandchildren.

Edward P. Coxhead

Edward P. Coxhead, head of his own company, E. P. Coxhead Co., Oakland, Calif., died January 20.

Before acquiring this company, Mr. Coxhead spent 35 years with Pioneer Rubber Mills, San Francisco, Calif. He was instrumental in establishing the Midwest branch in Chicago, Ill., and was district manager there for several years. When he left, he held the position of vice president in charge of sales for Pioneer.

He was born February 17, 1899, in Berkeley, Calif. He is survived by his wife, a son, and a daughter.

William F. Shore

William F. Shore, president of The Shore Instrument & Mfg. Co., Inc., Jamaica, L. I., N. Y., died of heart disease on March 14.

Mr. Shore, who invented the Shore durometer for testing the hardness of rubber and the Shore scleroscope for testing the hardness of metals, was cofounder of the company. He served as vice president and secretary from 1907 until 1936, when he became president. In addition he held many patents on laboratory instruments for testing the physical properties of materials.

The deceased was born in 1883 in Amityville, L. I., N. Y. He attended the public schools there.

Funeral services were held March 17 at Freeport, L. I., N. Y., with burial the same day at Westbury, L. I., N. Y.

He is survived by his wife, his son, three daughters, a brother, and a sister.

W. C. Dunlap

William C. Dunlap, manager of purchasing of The New Jersey Zinc Co., New York, N. Y., died February 18 of a heart attack at his home in New York.

Mr. Dunlap joined the company in 1915 as a civil engineer in the purchasing department and advanced to purchasing agent in 1945 and manager of purchasing in 1955.

He was born 66 years ago in Harrisburg, Pa., and was graduated from Princeton University. He was a member of The Purchasing Agents Association and The Princeton Club.

He is survived by his wife, two sons, two daughters, a sister, and six grandchildren.

C. M. Davidson

Charles M. Davidson, sales manager of Hodgman Rubber Co., Framingham, Mass., died suddenly, February 15, at his home in Dover, Mass.

Mr. Davidson, who was associated with Hodgman Rubber for more than 30 years, was well known in the rubber, textile, and leather trades. He was considered an expert on coated fabrics.

The deceased was a member of the Wellesley Country Club and was an outstanding golfer who had competed successfully in amateur tournaments.

He is survived by his wife, his mother, a daughter, several grandchildren, two brothers, and two sisters.

Mr. Davidson was born in Dorchester, Mass., 59 years ago.

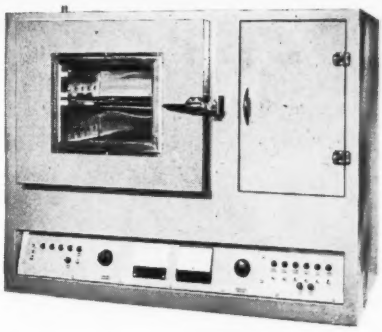
A Solemn High Mass was sung at St. Paul's Church, Wellesley, February 18. He was buried at Holyhood Cemetery, Brookline, Mass.

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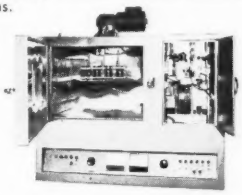
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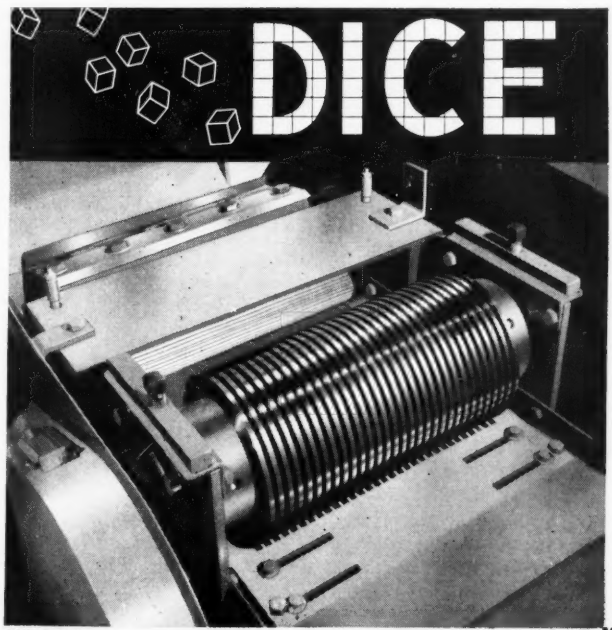


FIG. G-100

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MARKET REVIEWS

Natural Rubber

During the February 16-March 15 period the natural rubber market was stimulated by fresh buying by China in Singapore. This, coupled with reports that Russia had been buying RSS #1 for March shipment from Thailand, Malaya, and Ceylon, caused much excitement in the major market centers.

It is believed that the Russian purchases totaled about 7,500 tons and that a similar amount was taken by China. Any immediate continuation of such buying could upset the supply/demand equilibrium and lead to a further advance in values. The market, consequently, has been quite sensitive and reacts to the slightest provocation.

Singapore has most of the time given the lead, followed by New York and London, though to a lesser degree, as larger quantities of unsold rubber were arriving to meet the nearby needs of the terminal markets.

During the period under review the General Services Administration announced that it will continue to sell stockpiled rubber under the authority contained in the Independent Appropriation Act of 1960. A GSA spokesman estimated that the sale will run from 6,000 to 10,000 tons a month through June, with the total for the fiscal year in the neighborhood of 100,000 tons. He reported that, while the agency intended to sell only 50,000 tons in the current fiscal year, it has already sold 54,000 tons with no injury to the rubber market. There is a bill, now pending in Congress, which would allow GSA to sell 470,000 tons of its rubber stockpile over the next eight years.

February sales, on the New York Commodity Exchange, amounted to 12,280 tons, compared with 13,140 tons for January contract. There were 20 trading days in February, and 20 during the February 16-March 15 period.

REX CONTRACT

1960	Feb. 19	Feb. 26	Mar. 4	Mar. 11
Mar.	39.80	40.90	40.40	40.75
May	39.10	40.10	39.50	39.75
July	38.60	39.00	38.60	38.90
Sept.	38.00	38.50	38.10	38.30
Nov.	37.60	38.00	37.55	37.85
1961				
Jan.	37.00	37.20	37.10	37.20
Mar.	36.40	36.60	36.60	36.60

On the physical market, RSS #1, according to the Rubber Trade Association of New York, averaged 40.48¢ per pound for the February 16-March 15 period. Average February sellers' prices for representative grades were: RSS #3, 39.61¢; #3 Amber Blankets, 39.69¢; and Flat Bark, 36.65¢.

NEW YORK OUTSIDE MARKET

	Feb. 19	Feb. 26	Mar. 4	Mar. 11
RSS #1	40.00	40.88	40.50	40.50
#2	39.88	40.75	40.38	40.38
#3	39.75	40.63	40.25	40.25
Pale Crepe #1				
Thick	44.75	45.63	45.25	45.50
Thin	46.25	47.13	46.50	46.75
#3 Amber Blankets	40.50	41.25	39.63	39.88
Thin Brown Crepe	40.25	41.00	39.63	39.88
Standard Flat Bark	36.75	37.38	36.50	36.63

Synthetic Rubber

Consumption of new rubber in the United States for February totaled 138,745 long tons, compared with the 141,398 long tons consumed in January.

Production of synthetic rubber during February was 126,350 long tons, as compared with 130,742 long tons for January, according to the monthly report of The Rubber Manufacturers Association, Inc.

Consumption of all types of synthetic rubber in February amounted to 92,590 long tons, contrasted with January's consumption of 95,048 long tons. Synthetic rubber accounted for 66.73% of total new rubber, against 67.22% for January.

Consumption by type in February, compared with January usage, decreased for all types except nitrile, as follows: SBR, 76,590, against 78,902; neoprene, 7,130, against 7,279; butyl, 5,900, against 6,006; and nitrile, 2,970, against 2,861.

Total synthetic rubber exports for February increased to 31,300 long tons from 29,075 long tons in January; while total synthetic stocks increased to 224,793 long tons from 221,468 long tons in January.

Trends in SBR masterbatches showed the oil-black masterbatch production down to 20,533 long tons in February from 23,972 long tons in January. Carbon black masterbatches, in contrast, increased to 3,361 long tons in February from 2,954 long tons in January. The oil-extended rubber production showed another increase in February to 29,561 long tons from 27,350 long tons in January.

Scrap Rubber

During the first part of the period under review (February 16-March 15) fairly good activity was noted in the scrap rubber market, with prices generally holding at previously quoted levels. About the only revision of any note was the 6.00¢ price quoted for the mixed auto tubes at Akron. The same item continued to bring 5.50¢ at eastern points.

During the latter part of this period most factors in the trade attended the annual convention of the National Association of Waste Materials Dealers, in particular, the session of the Scrap Rubber & Plastics Institute, held in the Waldorf-Astoria, New York, N. Y., March 12-15. At the latter session, newly elected officers of the institute were announced as follows: president, Ben Gordon, A. Schulman, Inc.; vice president, Sidney Freedman, H. Muehlstein & Co., Inc.; and secretary-treasurer, Si Wakesberg, NAWDMA. At this session it was agreed to that a new executive committee would be appointed by the officers.

The main subject of interest during the session pertained to the problem of educating scrap dealers on the economics and inherent difficulties of dealing with various plastic scrap. It was also suggested that a speaker should be obtained for a forthcoming area meeting to talk on this problem or on, "Metal Dealer's Problem in Respect to Plastics (Scrap)."

	Eastern Points	Akron, O.
	Per Net Ton	
Mixed auto tires	$7.00	$12.50
S.A.G. truck tires	nom.	17.00
Peeling, No. 1	nom.	26.00
2	nom.	22.00
3	nom.	19.00
Tire buffings	nom.	nom.
	(¢ per Lb.)	
Auto tubes, mixed	5.50	6.00
Black	5.75	5.75
Red	6.25	6.25
Butyl	7.00	7.00

Latex

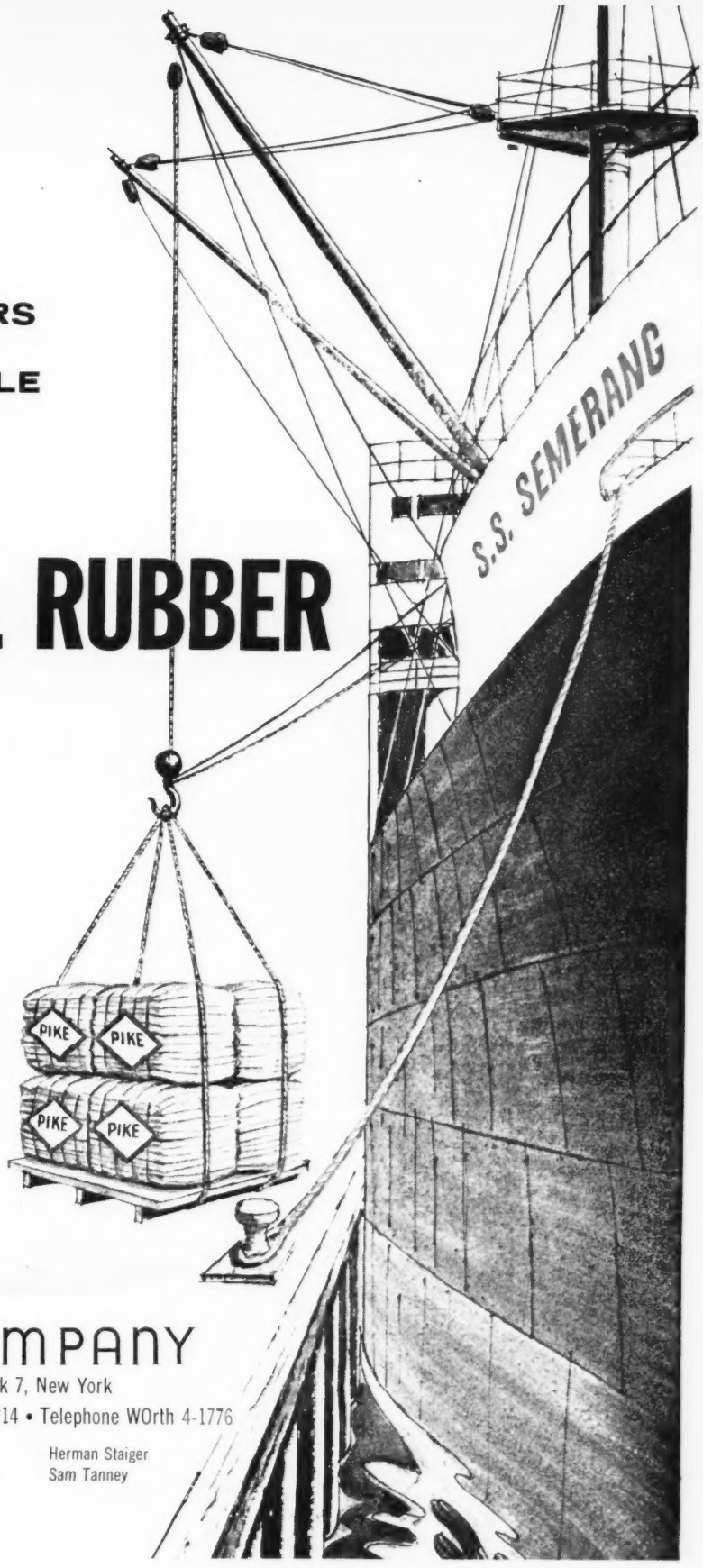
A moderate amount of interest in drum latex was maintained during the first part of the February 16-March 15 period. According to trade sources, however, the recent further advance in the value of dry rubber has had a somewhat restraining influence on buyers. Recent interest has been shown in

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Erie, Pennsylvania

forward shipment, but this has so far not extended into the second half of the year.

Consumption of natural latex in the United States in January was 5,487 tons, compared with 5,206 tons in December and 7,184 tons in January, 1959. Stocks on January 31, 1960, were 12,781 tons against 12,377 tons at the end of December.

According to recently published statistics, United Kingdom consumption in 1959 was 27,022 tons, against 26,207 tons in 1958, and West Germany consumed 12,786 tons in 1959, compared with 12,917 tons in 1958. These figures are notable in view of the general increase in the overall consumption of new rubber in the two countries. The explanation is the increasing use of synthetic latices, which is expanding at the expense of natural, even though this development is not so marked in Europe as in the United States.

Prices for ASTM centrifuged concentrated natural latex, in tank-car quantities, f.o.b., rail tank car, ran about 46.60¢ per pound solids. Synthetic latices prices were 26.0 to 40.25¢ for SBR; 37 to 57¢ for neoprene; and 45 to 60¢ per pound for the nitrile types.

(All figures in long tons, dry weight)

Type of Latex	Production	Imports	Consumption	Month End Stocks
Natural				
Dec.	0	6,705	5,206	12,377
Jan.	0	*	5,487	12,781
SBR				
Dec.	8,429	—	7,428	8,226
Jan.	9,720	—	7,889	7,672
Neoprene				
Dec.	1,017	0	895	1,581
Jan.	1,154	0	956	1,627
Nitrile				
Dec.	1,045	0	993	2,883
Jan.	1,131	0	1,185	3,004

* Not available yet for period covered.

Reclaimed Rubber

Reclaimed rubber business between February 16-March 15 was good, reported a reclaimer in the Mid West, but there was no definite big pickup as had been expected. With the automotive companies cutting back on their production, this reclaimer expected a further slowdown in business.

A reclaimer in the East reported that sales were approximately 6% higher during the period under review than in the previous period. The reclaimed rubber business is expected to continue to be good this year, but is running about 4% behind that of the first quarter of 1959, when tire production was running heavy to build up inventories in case of a strike.

Another reclaimer in the East stated that the reclaimed business continued at the high rate of production and consumption which had prevailed since the first of the year. The trend is expected to be modified as there has been some curtailment in the automotive industry. This will be partially offset by the sizeable increase of export orders. This reclaimer also reported a price increase or ½¢ a pound on a majority of reclaims and ground rubber. The price of butyl reclaim was increased 1¢ a pound; while the price of natural tube reclaims went unchanged.

According to The Rubber Manufacturers Association, Inc., report, February production of reclaimed rubber was 27,025 long tons; while consumption was 25,680 long tons. January figures had been: production, 26,442 long tons; consumption, 26,112 long tons.

RECLAIMED RUBBER PRICES

Whole tire, first line	$0.115
Third line	.1075
Inner tube, black	.17
Red	.21
Butyl	.16
Light carcass	.22
Mechanical, light-colored, medium gravity	.185
Black, medium gravity	.10

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims, in each general group separately featuring characteristic properties of quality, workability, and specific gravity, at special prices.

Rayon and Nylon

A recent trend in the tire cord business seems to be the announcements of a number of companies relative to starting production of nylon 6. Dow Chemical Co.'s James River division is constructing a nylon 6 plant at Williamsburg, Va., with an initial capacity of 12,000,000 pounds. Allied Chemical Corp. has reported plans to triple capacity for production of its Golden Caprolan nylon 6 tire yarn at Hopewell, Va., bringing its total annual producing capacity for nylon tire yarn in the range of 50,000,000 pounds. The Chemstrand Corp. has revealed plans which will increase its production facilities for nylon 66 yarn in the amount of 75,000,000 pounds annually by November, 1961.

About $350 million worth of fabric will be purchased by the rubber industry this year for making tires. Last year, 124 million pounds of nylon and 297 million pounds of rayon were used by the rubber industry. Last year, nylon captured almost half the replacement market (for passenger-car tires) and achieved a commanding lead in heavy-duty (aircraft, truck, and tractor) tires. The nylon makers are now aiming for the original-equipment passenger-car tire market.

The rayon-nylon battle represents serious business for its participants. About one-third of the rayon used in the United States last year went into tires. Following the recent price cutting trend, the rayon producers have their backs to the wall. There is little profit for them at current prices. One company (Industrial Rayon Corp.) has

CYANAMID RUBBER Chem Lines

NO. 26 OF A SERIES Published by AMERICAN CYANAMID COMPANY, Rubber Chemicals Department, Bound Brook, New Jersey

NOW—The Best Dispersible MBTS

A new MBTS in a highly dispersible form is now available from Cyanamid. The result of a two-year program of research and process development, the new MBTS presents real benefits to all users of this popular accelerator. It is *unchanged* chemically; has identical curing activity to our former material. The only change is in the ability to disperse quickly, uniformly, smoothly on the mill or in the Banbury.

Good accelerator dispersion is important in all types of rubber manufacture. First to come to mind are wire and cable insulation, where undispersed lumps lead to "blows" and expensive patching, and thin-walled molded goods where local overcures and weak spots or holes result. In heavier molded goods, e.g., mats and flooring, poor dispersion may show up as rejects due to lumps or pockmarks in the surface, or staining in light-colored products. The quality-conscious tire and mechanical goods manufacturer is aware of the hazard of internal weak spots due to local overcures caused by a poorly dispersed accelerator. Cyanamid's new MBTS will be a boon to all these.

The excellent dispersion qualities are immediately apparent in either plant or laboratory mixing. The following illustrates a typical laboratory test. A 20% masterbatch of MBTS in pale crepe is prepared in the usual way. (Incidentally, where masterbatching is done only to get good dispersion it may be eliminated in many cases with this new MBTS. Where it is desirable to masterbatch for other reasons more concentrated masterbatches are possible because of the excellent ease of dispersion.) The complete lack of caking on the back roll with the new MBTS can be easily noted. The new product incorporates quickly with a minimum of fall-through; it may even be possible to decrease the mixing time over present practice and still get better dispersion.

After five-minutes milling the batch is sheeted off and cooled. It is then stretched out with the fingertips and examined against a strong light (Fig. 1). Small lumps and undispersed particles are easily seen by this technique. Figure 2 shows how Cyanamid's new MBTS (B) compares with an old style product (A) and with a competitive "improved" type (C). Because the pictures were taken by transmitted light the lumps and agglomerates appear as dark spots in these photos.

Compare Cyanamid's new MBTS with the product you are currently using by any procedure, our test* or yours, plant or laboratory, mill or Banbury mixer. By whatever criterion you consider important, Cyanamid's MBTS is the best available.

Look for:

1. Fast incorporation time—cut mixing cycle or get better dispersion in same cycle.

2. No caking on back roll—eliminate time-consuming scraping or loss of accelerator.

3. Smooth, uniform dispersion—minimize blows, pocks, local overcures due to accelerator lumping.

4. No change in curing activity—no need for lengthy acceptance tests—no changes in formulations.

5. Uniformity from shipment to shipment—eliminate variations in dispersion characteristics.

*Rubber Chemicals Special Report No. 79 describes in detail a laboratory dispersion test for MBTS. Copies are available upon request to the Rubber Chemicals Department at Bound Brook, New Jersey.



Fig. 1—Viewing accelerator dispersion in thin film of rubber masterbatch.

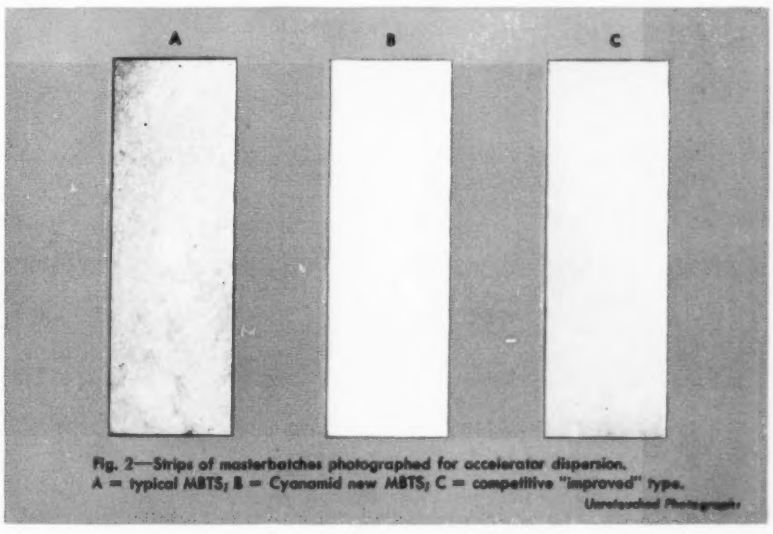


Fig. 2—Strips of masterbatches photographed for accelerator dispersion. A = typical MBTS; B = Cyanamid new MBTS; C = competitive "improved" type. Unretouched Photograph

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DETROIT 27 — Clifford Armstrong Co., 16187 Grand River Ave.
HOUSTON 17, TEX. — The Alpha Engineering Co., Box 12371
CHARLOTTE, N.C. — D. H. Caldwell Co., 2009 Wood Dale Terrace
ATLANTA, GA. — J. R. Angel, Mortgage Guarantee Building
TORONTO 1, CAN. — Hugh Williams & Co., 27 Wellington St. East

taken steps to diversify into another business, and others (Beaunit Mills, Inc., and American Enka) have either gone into nylon tire yarn or are seriously considering such a move. There is indication that nylon will capture a share of the original-equipment market, if not within the 1961 models, then with the 1962 models.

Totaled packaged production of rayon and acetate filament yarn during February was 57.9 million pounds, consisting of 25.8 million pounds of high-tenacity rayon yarn, and 32.1 million pounds of regular-tenacity rayon yarn. Totaled packaged production for January had been: total, 58.5 million pounds; high-tenacity, 26.4 million pounds; and regular-tenacity, 32.1 million pounds.

Filament yarn shipments for February to domestic consumers totaled 56.1 million pounds, of which 25.1 million pounds were high-tenacity rayon yarn, and 31.0 million pounds were regular-tenacity rayon yarn. Shipments for January had been: total, 56.9 million pounds; high-tenacity, 26.6 million pounds; regular-tenacity, 30.3 million pounds.

End-of-February stocks for rayon and acetate filament yarn were: total, 58.0 million pounds; high-tenacity, 15.0 million pounds; regular-tenacity, 43.0 million pounds. End-of-January stocks had been: total, 56.9 million pounds; high-tenacity, 14.6 million pounds; and regular-tenacity, 42.3 million pounds.

Rayon Prices

Tire Fabrics

1100/490/2	$0.625/$0.78
1650/908/2	.685
2200/980/2	.655

Tire Yarns

High-Tenacity	
1100/ 490, 980	.57/ .66
1100/ 490	.57/ .66
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .66
1230/ 490	.59/ .63
1650/ 720	.50/ .60
1650/ 980	.50/ .58
1875/ 980	.55/ .58
2200/ 960	.49/ .57
2200/ 980	.49/ .57
2200/1466	.49/ .64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.50/ .60
1900/ 720	.58

Nylon Prices

Tire Yarns

840/140	.97
1680/280	.97

Industrial Fabrics

During the February 16-March 15 period wide industrial grey cotton goods followed a firm price course in the face of buyer requirements more or less concentrated on fill-in yard-

ages. The market, according to trade sources, was reacting normally for this time of year, awaiting a resurgence later on.

In some quarters notice was taken of the numerous foreign-made cloth offerings showing up from an increasing number of countries. These are cloths made in South America, Asia, Japan, Europe, and elsewhere. They are described as below this country's standards, but prices attached somehow blur their otherwise inferior qualities.

One reason domestic industrial grey goods prices are firm, and possibly will head higher, is that mills have begun to pay a 5% wage advance. There are some cloths, such as drills, sheetings, and other goods, priced and sold at a half-cent a yard below others. This situation, it is said, results from their having maintained a similar differential when business was at its highest point of activity, based on quality preference and dependability.

Industrial Fabrics

Drills*

59-inch, 1.85, 68x40	*yd.*	$0.40
2.25, 68x40		.34

Broken Twills*

54-inch, 1.14, 76x52	*yd.*	.52
58-inch, 1.06, 76x52		.585
60-inch, 1.02, 76x52		.5825

Osnaburgs*

40-inch, 2.11, 35x25	*yd.*	.2275
3.65, 35x25		.1525
59-inch, 2.35, 32x26		.30
62-inch, 2.23, 32x26		.31

Ducks

Numbered Duck†

List less 45%

Enameling Ducks*

	S. F.	D. F.
38-inch, 1.78 yd.	$0.3263	.3313
2.00 yd.	.275	.33
51.5-inch, 1.35 yd.	.4738	.4888
57-inch, 1.22 yd.	.4838	.50
61.5-inch, 1.09 yd.	.5413	.5538

Hose and Belting Ducks*

Basis	*lb.*	.67

Army Duck†

52-inch, 11.70 oz., 54x40 (8.10 oz./sq.yd.)	*yd.*	.5925

Sheeting*

40-inch, 3.15, 64x64	*yd.*	.2175
3.60, 56x56		.185
52-inch, 3.85, 48x48		.2375
57-inch, 3.47, 48x48		.25
60-inch, 2.10, 64x64		.375
2.40, 56x56		.34

Sateens*

53-inch, 1.12, 96x60	*yd.*	.645
1.32, 96x64		.575
57-inch, 1.04, 96x60		.615
58-inch, 1.02, 96x60		.7025
1.21, 96x64		.62

Chafer Fabrics*

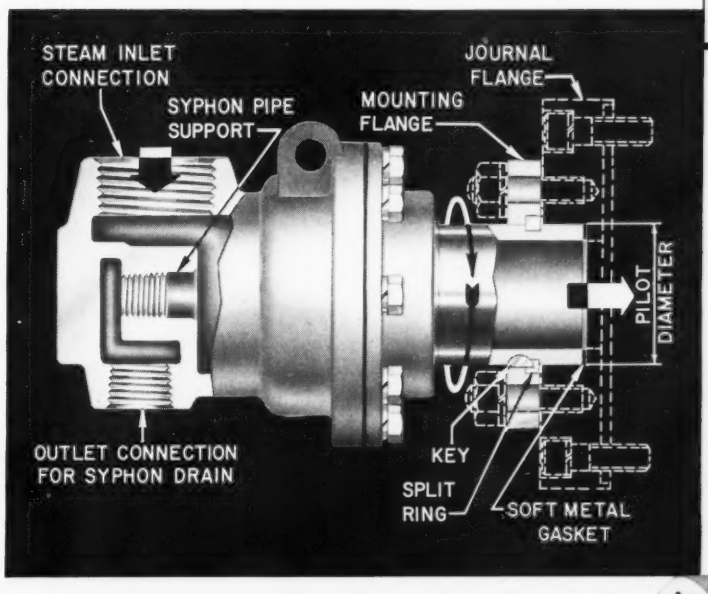
14.40-oz./sq.yd. P.Y.	*lb.*	.74
11.65-oz./sk.yd. S.Y.		.65
10.80-oz./sq.yd. S.Y.		.68
8.9-oz./sq.yd. S.Y.		.70
40-inch, 2.56, 35x25		.25
60-inch, 1.71, 35x25		.435

* Net 10 days.
† 2% 10 days.

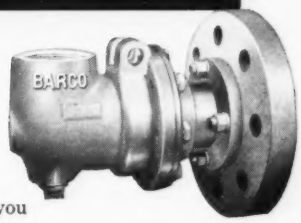
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and accurate control of concentricity



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STATISTICS of the RUBBER INDUSTRY

U.S.A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958	67,591	65,706	10,679	11,560	87,945	155,536
1959	79,207	93,303	13,127	14,034	120,464	199,671
May	6,007	6,583	1,146	1,156	8,885	14,892
June	7,445	6,730	1,223	1,196	9,149	16.594
July	5,469	6,871	956	1,279	9,106	14,575
Aug.	7,131	8,225	1,242	1,258	10,725	17,856
Sept.	6,947	8,201	956	1,364	10,521	17,468
Oct.	6,747	9,424	1,020	1,187	11,631	18,378
Nov.	5,055	8,144	1,206	1,104	10,454	15,509
Dec.	6,705	8,429	1,017	1,045	10,491	17,196
1960						
Jan.*	....	9,720	1,154	1,131	12,005	....

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Consumption of Natural (Including Latex) and Synthetic Rubber (Long Tons)

Year	Natural	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1958	484,492	730,196	53,432	69,694	26,590	1,364,404
1959	555,044	886,275	65,454	84,955	34,638	1,626,366
May	38,777	60,870	3,978	6,914	2,853	113,392
June	47,786	76,065	5,484	7,083	3,063	139,481
July	47,545	78,995	6,043	6,277	2,419	141,279
Aug.	46,914	75,340	5,533	7,117	3,047	137,951
Sept.	49,252	79,835	6,579	7,326	3,119	146,111
Oct.	49,049	81,963	5,965	7,538	3,128	147,643
Nov.	42,039	69,217	5,327	6,684	2,655	125,922
Dec.	42,950	73,871	5,489	6,996	2,696	132,002
1960						
Jan.*	46,350	78,902	6,006	7,279	2,861	141,398

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958	8,900	7,672	1,663	2,519	11,754	20,654
1959	12,377	8,226	1,581	2,883	12,690	25,607
May	9,718	7,917	1,417	2,398	11,732	21,450
June	11,063	7,314	1,601	2,432	11,347	22,410
July	10,752	6,983	1,528	2,761	11,272	22,024
Aug.	11,472	6,775	1,576	2,779	11,130	22,602
Sept.	11,742	7,196	1,498	2,810	11,504	23,246
Oct.	12,220	7,570	1,464	2,888	11,922	24,142
Nov.	11,707	8,279	1,451	2,975	12,705	24,412
Dec.	12,377	8,226	1,581	2,883	12,690	25,067
1960						
Jan.*	12,781	7,781	1,627	3,004	12,412	25,193

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1958	259,809	248,156	11,362	29,063
1959	303,345	286,410	12,812	27,738
May	19,401	20,496	980	23,554
June	26,119	24,998	1,054	23,448
July	27,863	23,942	1,236	25,949
Aug.	25,276	22,914	879	26,165
Sept.	28,123	25,137	937	27,384
Oct.	28,255	26,022	964	27,393
Nov.	22,525	20,217	909	28,526
Dec.	23,720	22,962	1,055	27,738
1960				
Jan.*	26,442	26,112	....	28,636

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce

U.S.A. Exports of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1958	142,069	13,793	31,337	6,718	193,917
1959	220,336	21,700	39,551	8,256	289,843
Jan.	11,962	1,579	3,430	520	17,491
Feb.	11,615	1,169	2,404	648	15,836
Mar.	16,295	2,238	2,712	467	21,712
Apr.	19,154	2,135	3,741	527	25,557
May	12,281	2,587	2,942	642	18,452
June	21,871	2,386	2,522	937	27,716
July	19,814	1,580	4,105	440	25,939
Aug.	18,054	1,896	2,557	1,025	23,532
Sept.	22,506	2,240	4,864	692	30,302
Oct.	13,476	1,383	2,250	679	17,788
Nov.	18,916	1,242	3,362	648	24,168
Dec.	25,392	1,265	4,662	1,031	32,350

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce

U.S.A. Stocks of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1959					
Jan.	147,243	16,827	15,638	7,335	187,043
Feb.	148,606	16,339	15,990	7,468	188,403
Mar.	146,971	14,441	14,701	7,753	183,866
Apr.	147,867	12,496	14,848	7,728	182,939
May	156,209	12,710	15,024	7,820	191,763
June	145,486	11,128	14,986	7,969	179,569
July	142,606	9,899	15,187	8,912	176,604
Aug.	148,795	10,558	15,745	8,418	183,516
Sept.	147,400	9,535	12,845	8,526	178,306
Oct.	157,768	10,805	13,385	8,649	190,607
Nov.	168,490	11,447	13,043	9,077	202,057
Dec.	174,606	13,188	14,164	8,888	210,846
1960					
Jan.*	183,242	13,838	14,985	9,403	221,468

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

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World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	Eastern Europe and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1958	485.2	427.0	175.5	895.8	1,497.3	1,982.5
1959	555.0	...	180.6	...	...	2,105.0
Jan.	50.0	49.6	15.3	77.2	127.2	192.5
Feb.	47.3	29.8	13.8	77.7	117.5	167.5
Mar.	52.0	19.0	15.3	78.8	117.7	165.0
Apr.	41.5	37.8	13.9	80.2	131.0	172.5
May	38.8	41.2	13.8	76.2	131.2	170.0
June	47.8	42.1	18.3	82.4	134.7	182.5
July	47.5	32.7	13.0	74.3	112.0	172.5
Aug.	46.9	16.8	11.0	67.8	84.6	142.5
Sept.	49.3	41.1	18.1	81.5	122.6	190.0
Oct.	49.0	40.0	15.5	78.5	118.5	185.0
Nov.	42.0	49.4	15.6	78.0	127.4	185.0
Dec.	43.0	...	17.0	...	...	185.0

*Estimated.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; and Secretariat of the International Rubber Study Group.

World Production of Natural Rubber

(1,000 Long Tons)

	Malaya		Indonesia			
Year	Estate	Native	Estate	Native	All Other	Total
1958	390.9	272.7	237.4	377.1	679.4	1,957.5
1959	408.4	289.8	...	...	...	...
Jan.	37.6	27.2	20.4	22.3	67.5	175.0
Feb.	27.9	21.2	18.3	29.2	38.4	135.0
Mar.	28.5	21.1	17.7	39.4	48.3	155.0
Apr.	28.9	19.4	15.3	44.7	46.7	155.0
May	33.5	22.4	16.3	50.6	49.7	172.5
June	33.9	24.3	18.4	49.5	39.9	165.0
July	35.7	26.9	18.7	35.5	63.2	180.0
Aug.	36.5	24.9	17.9	43.5	54.7	177.5
Sept.	35.7	26.1	17.0	38.8	52.4	170.0
Oct.	36.0	25.5	18.0	53.0	68.5	192.5
Nov.	35.7	24.1	18.0	44.5	62.7	185.0
Dec.	38.6	26.7	...	...	...	...

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; Secretariat of the International Rubber Study Group.

World Consumption of Synthetic Rubber*

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdom	Total† Continent of Europe	World† Grand Total
1958	872.2	46.7	63.0	174.0	1,247.5
1959	1,071.3	57.2	79.0	...	...
Jan.	89.6	4.4	5.8	15.8	122.5
Feb.	87.4	5.2	5.7	17.5	125.0
Mar.	95.1	5.0	7.0	17.5	132.5
Apr.	79.7	5.1	6.2	18.3	120.0
May	74.6	4.8	6.0	18.3	112.5
June	91.7	5.5	8.1	18.5	135.0
July	93.7	4.5	5.4	19.0	135.0
Aug.	91.0	3.4	4.3	15.5	127.5
Sept.	96.9	5.0	8.3	20.0	142.5
Oct.	98.6	4.8	6.6	20.8	142.5
Nov.	83.9	4.9	7.2	22.3	130.0
Dec.	89.1	4.7	8.7	...	132.5

*Includes latices.

† Figures estimated or partly estimated.

Source: Secretariat of the International Rubber Study Group; and Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany	Total
1958	1,054.6	135.0	22.7	1,212.3
1959	1,379.7	100.7	48.1	1,528.5
Jan.	108.5	13.0	2.0	123.5
Feb.	102.3	11.7	2.3	116.3
Mar.	111.4	7.5	3.7	122.6
Apr.	108.5	0.0	3.5	111.9
May	110.0	0.3	3.0	113.3
June	106.7	0.4	4.7	111.5
July	114.3	9.2	3.2	126.7
Aug.	119.0	11.1	4.7	134.8
Sept.	119.8	11.4	4.6	135.9
Oct.	128.5	11.5	5.1	145.1
Nov.	124.8	11.9	5.4	142.1
Dec.	125.8	13.0	5.9	144.7

Source: Secretariat of the International Rubber Study Group; and Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber (in Long Tons)

Year	Natural	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1958	474,409	872,602	52,241	97,806	31,976	1,529,034
1959	580,197	1,130,660	81,008	124,815	43,169	1,959,849
Jan.	54,950	90,261	4,992	9,991	3,260	163,454
Feb.	48,917	83,067	5,650	10,256	3,324	151,214
Mar.	48,584	91,847	6,056	9,690	3,784	159,961
Apr.	44,347	88,444	6,279	10,455	3,299	152,824
May	45,451	89,625	6,467	10,249	3,610	155,402
June	46,048	87,221	5,583	10,216	3,696	153,124
July	47,527	94,749	6,391	9,365	3,811	161,843
Aug.	45,359	97,113	8,050	10,471	3,397	164,930
Sept.	47,643	97,677	7,399	10,888	3,883	167,490
Oct.	48,378	106,643	7,957	10,099	3,833	176,910
Nov.	48,844	101,856	7,523	11,660	3,786	173,669
Dec.	54,149	102,157	8,661	11,475	3,486	179,928
1960						
Jan.*	....	106,853	8,171	11,958	3,760	....

*Preliminary.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958	70,183	60,283	9,555	10,549	80,387	150,570
1959	71,745	80,646	11,394	13,258	105,298	177,043
Jan.	7,184	6,886	925	1,244	9,055	16,239
Feb.	6,489	7,083	859	1,009	8,951	15,440
Mar.	7,052	7,275	1,054	1,208	9,537	16,589
Apr.	5,793	5,629	1,104	1,169	7,902	13,695
May	5,429	5,962	995	1,112	8,069	14,966
June	5,622	6,497	910	1,150	8,557	14,179
July	5,004	5,804	919	940	7,663	12,667
Aug.	6,613	7,348	961	1,116	9,425	16,038
Sept.	6,342	6,919	910	1,178	9,007	15,349
Oct.	6,153	7,388	969	1,158	9,515	15,668
Nov.	4,858	6,427	893	981	8,301	13,159
Dec.	5,206	7,428	895	993	9,316	14,522
1960						
Jan.*	5,487	7,889	956	1,185	10,030	15,517

* Preliminary.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

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U.S.A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumer's Price Index
		All Rubber Products			
1939	121.0	$27.84	39.9	$0.75	
1958					
July	175.1	91.89	39.2	2.35	123.7
Aug.	181.2	96.80	40.5	2.39	123.7
Sept.	187.5	97.51	40.8	2.39	123.7
Oct.	194.5	97.27	40.7	2.39	123.7
Nov.	195.3	98.09	40.7	2.41	123.9
Dec.	198.2	102.66	41.9	2.45	123.7
1959					
Jan.	199.1	100.28	41.1	2.44	123.8
Feb.	198.8	101.09	41.6	2.43	123.7
Mar.	201.5	103.74	42.0	2.47	123.7
Apr.	176.0	101.57	41.8	2.43	123.9
May	171.8	101.46	42.1	2.41	124.0
June	196.1	98.74	40.3	2.45	124.5
July	203.4	107.10	42.5	2.52	124.9
Aug.	203.8	105.33	42.3	2.49	124.8
Sept.	212.4	102.01	41.3	2.47	125.2
Oct.	212.3	101.18	40.8	2.48	125.5
Nov.	209.4	98.15	39.9	2.46	125.6
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1958					
July	71.0	106.59	38.9	2.74	
Aug.	72.5	113.96	40.7	2.80	
Sept.	74.1	113.40	40.5	2.80	
Oct.	75.3	113.24	40.3	2.81	
Nov.	76.2	115.75	40.9	2.83	
Dec.	77.1	121.40	42.3	2.87	
1959					
Jan.	76.9	117.55	41.1	2.86	
Feb.	76.2	118.98	41.6	2.86	
Mar.	77.9	122.96	42.4	2.90	
Apr.	66.0	123.98	42.9	2.89	
May	52.2	126.13	42.9	2.94	
June	70.7	108.93	36.8	2.96	
July	79.7	128.74	43.2	2.98	
Aug.	78.4	127.74	43.3	2.95	
Sept.	80.5	117.56	40.4	2.91	
Oct.	79.7	117.49	40.1	2.93	
Nov.	78.7	113.88	39.0	2.92	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1958					
July	15.9	75.25	39.4	1.91	
Aug.	16.4	77.18	40.2	1.92	
Sept.	16.8	76.62	39.7	1.93	
Oct.	17.1	77.01	39.9	1.93	
Nov.	17.2	77.22	39.6	1.95	
Dec.	17.1	78.01	39.8	1.96	
1959					
Jan.	17.1	78.20	39.9	1.96	
Feb.	17.1	80.59	40.7	1.98	
Mar.	17.4	79.79	40.3	1.98	
Apr.	12.9	73.05	39.7	1.84	
May	17.7	79.58	40.6	1.96	
June	18.2	81.58	41.2	1.98	
July	18.3	78.60	40.1	1.96	
Aug.	18.4	79.17	40.6	1.95	
Sept.	19.0	79.18	40.4	1.96	
Oct.	19.1	79.40	39.9	1.99	
Nov.	19.7	79.80	39.9	2.00	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1958					
July	88.2	83.53	39.4	2.12	
Aug.	92.3	86.24	40.3	2.14	
Sept.	96.6	89.21	41.3	2.16	
Oct.	102.1	88.78	41.1	2.16	
Nov.	101.9	88.54	40.8	2.17	
Dec.	104.0	92.60	41.9	2.21	
1959					
Jan.	105.1	91.27	41.3	2.21	
Feb.	105.5	91.96	41.8	2.20	
Mar.	106.2	93.02	41.9	2.22	
Apr.	97.1	90.03	41.3	2.18	
May	101.9	92.18	41.9	2.20	
June	107.2	94.98	42.4	2.24	
July	105.4	95.40	42.4	2.25	
Aug.	107.0	93.21	41.8	2.23	
Sept.	112.9	94.73	42.1	2.25	
Oct.	113.5	93.38	41.5	2.25	
Nov.	111.0	89.91	40.5	2.22	

Source: BLS, United States Department of Labor.

U.S.A. Automotive Pneumatic Casings

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
Passenger Car						
1959						
Jan.	2,631	6,028	56.9	8,716	8,859	17,998
Feb.	2,442	4,932	60.2	7,434	8,962	19,435
Mar.	2,930	6,261	61.7	9,253	9,959	20,181
Apr.	3,115	6,390	64.8	9,569	6,986	17,597
May	2,848	5,617	38.4	8,504	6,953	15,721
June	2,904	5,936	46.3	8,886	9,022	16,134
July	3,188	5,988	65.4	9,242	9,857	16,853
Aug.	973	5,721	67.3	6,761	8,458	18,677
Sept.	1,923	5,850	77.4	7,850	8,804	19,636
Oct.	2,628	6,015	78.9	8,722	9,374	20,287
Nov.	1,252	4,161	63.5	5,476	7,088	21,996
Dec.	2,916	3,829	105.8	6,849	8,349	23,599
1960						
Jan.	3,912	6,006	111	10,030	9,011	22,567
Truck and Bus						
1959						
Jan.	329	714	47	1,090	1,325	3,401
Feb.	364	679	74	1,117	1,308	3,584
Mar.	406	842	56	1,304	1,391	3,680
Apr.	479	907	44	1,430	1,039	3,276
May	442	738	41	1,222	943	3,006
June	488	820	44	1,352	1,272	2,954
July	400	844	47	1,290	1,366	3,023
Aug.	276	874	46	1,196	1,225	3,054
Sept.	422	969	58	1,448	1,299	2,906
Oct.	338	1,151	57	1,546	1,510	2,864
Nov.	189	737	56	981	1,259	3,137
Dec.	285	739	75	1,099	1,301	3,355
1960						
Jan.	421	826	45	1,292	1,315	3,376
Total Automotive						
1959						
Jan.	2,961	6,742	104	9,806	10,184	21,399
Feb.	2,805	5,611	135	8,551	10,270	23,019
Mar.	3,336	7,103	117	10,557	11,350	23,862
Apr.	3,594	7,297	108	10,999	8,025	20,872
May	3,291	6,356	79	9,726	7,796	18,727
June	3,392	6,756	90	10,237	10,294	19,098
July	3,588	6,832	112	10,532	11,223	19,877
Aug.	1,249	6,595	114	7,957	9,683	21,730
Sept.	2,345	6,819	135	9,298	10,103	22,542
Oct.	2,966	7,166	136	10,269	10,884	23,151
Nov.	1,440	4,898	120	6,458	8,347	25,133
Dec.	3,200	4,567	181	7,948	9,649	26,955
1960						
Jan.	4,333	6,833	156	11,322	10,325	25,943

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1959						
Jan.	287	4,450	63	4,800	3,806	7,536
Feb.	311	3,924	81	4,316	4,094	7,364
Mar.	339	4,013	83	4,435	4,459	7,629
Apr.	389	3,473	65	3,928	3,380	7,218
May	363	2,853	59	3,275	2,752	6,849
June	392	3,421	59	3,872	3,683	6,999
July	317	3,564	66	3,948	4,345	7,560
Aug.	210	3,297	77	3,583	3,716	7,848
Sept.	347	3,258	88	3,693	4,065	8,334
Oct.	265	3,571	79	3,915	4,392	9,088
Nov.	163	2,867	67	3,097	3,756	9,918
Dec.	240	2,793	102	3,135	3,612	10,536
1960						
Jan.	365	4,964	62	5,391	3,899	8,924

Source: The Rubber Manufacturers Association, Inc.

MACHINERY & SUPPPLIES FOR SALE CONTINUED

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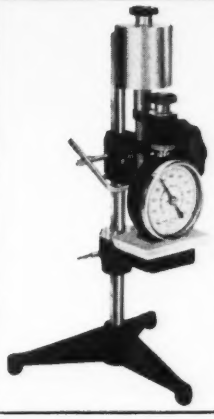
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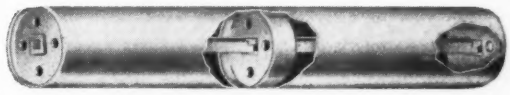
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Carbon Black Statistics—Twelve Months, 1959

Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; GPF, general-purpose furnace black; FEF, fast-extruding furnace black; HAF, high abrasion furnace black; SAF, super abrasion furnace black; ISAF, intermediate super abrasion furnace black.

(Thousands of Pounds)

Production

Furnace types	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Thermal	12,187	11,675	12,469	14,293	14,443	13,375	13,490	14,364	12,912	13,318	12,641	15,222
SRF	23,004	21,767	23,108	22,957	23,728	22,925	25,606	23,046	28,146	29,412	26,190	30,481
HMF	6,487	5,169	5,694	6,910	5,412	6,043	7,321	7,160	6,768	5,555	6,079	7,597
GPF	5,000	5,545	6,942	7,937	8,723	7,849	7,263	9,382	7,457	6,813	6,532	8,024
FEF	21,579	19,286	23,372	21,683	20,925	20,955	21,284	21,541	20,896	19,723	19,856	18,446
HAF	39,114	37,892	46,534	43,315	45,057	38,694	44,418	45,784	45,359	43,902	42,806	50,236
SAF	293	—	—	—	1,656	3,303	618	4	650	2,075	1,104	618
ISAF	16,605	14,490	19,262	19,770	18,365	16,366	21,133	21,571	20,494	21,735	21,514	23,630
Total furnace	124,269	118,824	137,381	136,265	138,309	130,010	141,493	142,852	142,682	142,533	136,722	154,254
Contact types	26,890	24,695	28,029	27,624	27,752	26,346	27,076	27,495	26,286	26,477	25,308	27,114
Totals	151,159	143,519	165,410	164,389	166,061	156,356	168,569	170,347	168,968	169,010	162,030	181,368

Shipments

Furnace types												
Thermal	12,283	12,658	14,904	13,223	12,313	14,105	12,299	14,242	15,640	13,695	13,848	14,229
SRF	26,251	26,009	29,465	24,244	21,012	23,650	25,805	26,811	31,050	27,247	27,722	28,100
HMF	6,420	5,122	6,299	5,895	5,748	6,061	7,454	6,579	7,949	5,933	7,333	8,164
GPF	6,977	7,245	7,397	8,336	8,375	8,091	8,898	6,781	7,148	7,849	7,055	7,874
FEF	24,511	20,924	25,949	19,575	17,558	20,991	22,865	22,163	24,077	20,453	21,255	19,018
HAF	45,800	42,890	47,161	40,675	32,238	43,360	49,883	47,625	52,007	45,225	43,441	46,328
SAF	615	583	897	553	946	1,543	950	1,147	1,053	1,054	1,488	731
ISAF	17,391	16,739	19,589	18,934	19,133	19,956	23,399	21,051	23,470	22,897	22,942	23,217
Total furnace	141,248	132,170	151,931	131,435	117,323	137,757	151,553	146,426	162,394	144,353	145,084	147,661
Contact types	31,852	28,221	29,214	24,453	26,386	25,574	29,207	26,198	35,488	26,914	33,493	30,132
Totals	17,100	160,391	181,145	155,888	143,709	163,331	180,760	172,624	197,882	171,267	178,577	177,793

Producers' Stocks, End of Period

Furnace types												
Thermal	23,181	22,198	19,759	20,829	22,959	22,729	23,920	24,042	21,314	20,937	19,730	20,723
SRF	35,764	31,522	25,165	23,979	26,842	26,254	26,192	22,585	19,681	21,846	20,314	22,695
HMF	6,856	6,903	6,298	7,169	6,686	6,668	6,535	7,162	5,981	5,603	4,349	3,782
GPF	7,658	5,958	5,503	5,104	5,452	5,073	3,661	6,085	6,394	5,358	4,835	4,985
FEF	17,213	15,575	12,998	15,106	18,473	18,437	16,856	16,234	13,053	12,323	10,924	10,352
HAF	38,010	33,012	32,382	35,018	47,837	43,171	37,706	35,838	29,190	27,866	27,389	31,329
SAF	5,071	4,487	3,586	3,028	3,738	5,498	5,166	4,023	3,576	4,597	4,213	4,100
ISAF	38,708	39,459	38,862	39,698	38,930	35,340	33,074	33,594	30,618	29,456	28,273	28,654
Total furnace	172,461	159,114	144,553	149,931	170,917	163,170	153,110	149,563	129,807	127,986	120,027	126,620
Contact types	88,646	85,120	83,935	87,098	88,368	89,140	87,009	88,306	78,882	78,445	70,260	67,242
Totals	261,107	244,234	228,488	237,029	259,285	252,310	240,119	237,869	208,689	206,431	190,287	193,862

Exports

Furnace types												
Total furnace	29,543	19,442	30,154	29,600	27,123	163,170	30,453	28,201	44,114	25,455	24,876	—
Contact types	15,604	12,930	13,037	11,702	14,079	89,140	12,157	12,713	19,031	10,387	13,806	—
Totals	45,147	32,372	43,191	41,302	41,202	252,310	42,610	40,914	63,145	35,842	38,682	—

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

U.S.A. Rubber Industry Sales and Inventories

(Millions of Dollars)

	Value of Sales*				Manufacturers' Inventories*			
	1956	1957	1958	1959	1956	1957	1958	1959
Jan.	415	496	448	508	935	1,047	1,100	1,013
Feb.	445	495	413	490	970	1,036	1,087	1,032
Mar.	451	476	412	506	979	1,030	1,112	1,030
Apr.	445	490	429	543	970	1,031	1,047	1,015
May	464	481	428	524	985	1,024	1,020	995
June	450	458	445	520	975	1,027	986	1,013
July	459	514	478	519	987	1,045	980	1,075
Aug.	436	481	438	492	1,007	1,074	1,024	1,113
Sept.	429	481	464	544	1,007	1,074	1,024	1,114
Oct.	454	490	493	555	1,022	1,097	1,022	1,115
Nov.	463	431	472	482	1,024	1,101	1,018	1,120
Dec.	461	427	518	508	998	1,092	994	1,124
Total	5,372	5,720	5,438	6,191	Av. 988	12,678	12,414	12,759

* Adjusted for seasonal variation.

Source: Office of Business Economics, United States Department of Commerce.

U.S.A. Rubber Industry Economic Indicators

	Production Index*				% Return †			
	Total Rubber and Plastics Products Seasonally Adjusted		Without Seasonal Adjustment		On Sales		Investment On	
Year	1947-49 100%	1957 100%	1947-49 100%	1957 100%	R	R&MP‡	R	R&MP
1958	166	95	166	95	3.9	3.5	7.3	7.0
1959	199	114	199	114				
1959								
Jan.	189	108	198	113				
Feb.	197	113	208	119				
Mar.	196	112	206	118		3.9		8.0
Apr.	182	104	187	107				
May	183	105	179	103				
June	205	117	199	114		4.4		10.4
July	223	128	187	107				
Aug.	210	120	203	117				
Sept.	209	120	212	121		4.1		8.8
Oct.	201	115	211	121				
Nov.	198	113	203	116				
Dec.	203	116	194	111				

* F.R.B. Index of Industrial Production revised to include plastics products and change base period.

† Base Data F.I.C.-S.E.C.-Quarterly Financial Reports—% Calculated by RMA.

‡ R = Rubber; R&MP = Rubber and Miscellaneous Plastics, a classification revised according to the 1959 Standard Industrial Classifications.

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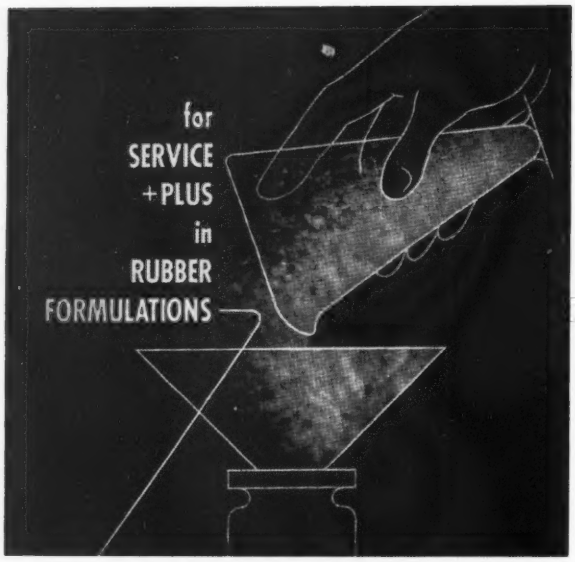
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U.S.A. Production of Cotton, Rayon, and Nylon Tire Fabrics

(Thousands of Pounds)

	Cotton and Nylon*			
1958	Cotton Chafer Fabrics and Other Tire Fabrics	Cotton and Nylon Tire Cord and Fabrics	Rayon Tire Cord and Tire Cord Fabric	Total All Tire Cord and Fabrics
Jan.-Mar.	9,750	18,820	66,830	167,924
Apr.-June	7,890	24,725	49,454	80,533
July-Sept.	7,999	24,904	†	91,984
Oct.-Dec.	10,533	26,392	71,827	107,532
1959				
Jan.-Mar.	9,163	32,402	77,307	122,661
Apr.-June	7,699	29,403	76,265	116,965
July-Sept.	8,318	31,545	76,671	119,748
Oct.-Dec.	7,279	34,179	66,756	111,703

* Cotton and nylon figures combined to avoid disclosing data for individual companies.
† Not available.
Source: Bureau of the Census, United States Department of Commerce.

Test Rubber Compounds

(*Continued from page 103*)

BFG researchers have found it quite difficult to locate the extracted material. The available quantities of the "leached out" material are never more than minute, and even the liberal use of such refined analytical equipment as the spectrophotometer, mass spectrometer, electron microscope, gas chromatography techniques, and radioactive tracer probings involving "tagged atoms" does not always overcome the extreme difficulty of analyzing the trace quantities involved. The laboratory studies have shown that the migration is primarily a leaching process, usually an interchange between a liquid food phase and the rubber or plastic.

Method Adopted by Goodrich

Primary method used by the BFG group, expressed in very simple terms, is to place the rubber sample in the test broth (see Figure 1) in a standard jar and to subject the solution to temperatures up to 200° F. for periods of time up to 30 days. At the end of this conditioning period the broth is evaporated to dryness. In this state, any extracted material crystallizes, and the crystals are then examined under the electron microscope to see exactly what they look like, to measure their particle size, and to note the shape of the particles to pinpoint the identity of the material extracted. (See Figure 2.)

A modification of the method is to prepare the sample with suspect material which has been made radioactive. These samples are run through the broth heating procedure at similar times and temperatures as above. The resulting broth liquid is then tested for radioactivity rather than being evaporated. (See Figure 3.) The liquid's radioactivity measurement will determine how much, if any, of the radioactive compounding ingredient leached out as a potential food additive. Reports from recent RMA-FDA meetings would seem to indicate that tests based on these BFG has used for the past year would be very seriously considered for universal adoption as industry standard methods.

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a new family of carbon blacks from Cabot

WHAT'S NEW IN CARBON BLACK? IN A WORD—REGAL. WHAT'S NEW ABOUT REGAL? IN A WORD—EVERYTHING.

The manufacturing process is different —
Regal blacks are produced world-wide by a new, exclusive process from oil.

The properties are different —
Regal blacks combine characteristics never before available in oil furnace blacks—making it possible to extend their use to compounds which traditionally have required more expensive pigments.

The advantages they offer are important —
Depending on the type of Regal black used, you can profit at least 3 significant ways. 1) *You save money* by choosing a Regal black to replace more costly blacks of another type. 2) *You save 'headaches'* because you are assured uninterrupted supply, unaffected by rising costs or limited availability of natural gas. 3) *You open up entirely new product possibilities* — because Regal blacks incorporate features never before available in *any* grade of carbon black.

Regal blacks are now in commercial production and available world-wide—another step in Cabot's long-range program to meet threatened gas shortages and rising natural gas prices. For complete information write:

CABOT **GODFREY L. CABOT, INC.**
125 HIGH STREET, BOSTON 10, MASSACHUSETTS

Performance Characteristics of 3 New Regal Blacks

REGAL 300
an excellent channel replacement oil black, combining virtually identical channel black properties with the faster curing rate of HAF types.

REGAL 600
a striking combination of low hardness/high tread wear resistance never before provided by a carbon black, offering interesting product improvement possibilities.

REGAL SRF
the first oil furnace SRF black. Matches, and in some cases excels performance of gas-produced SRF blacks.